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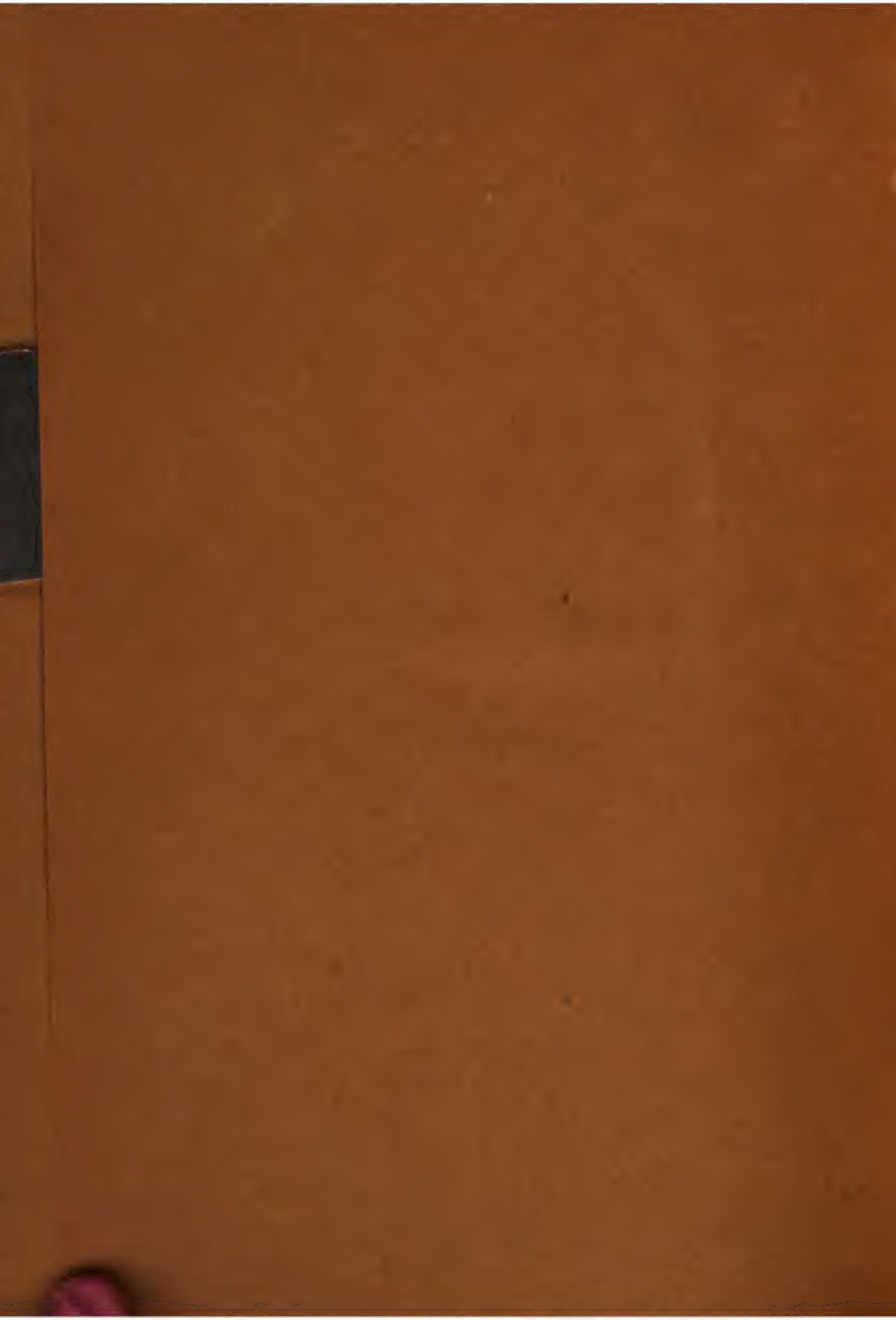
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THE ANNALS OF OPHTHALMOLOGY.

A QUARTERLY JOURNAL AND REVIEW OF

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FOUNDED BY JAMES PLEASANT PARKER

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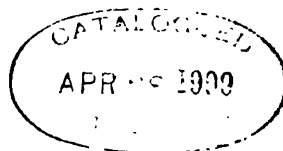
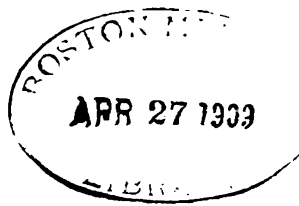
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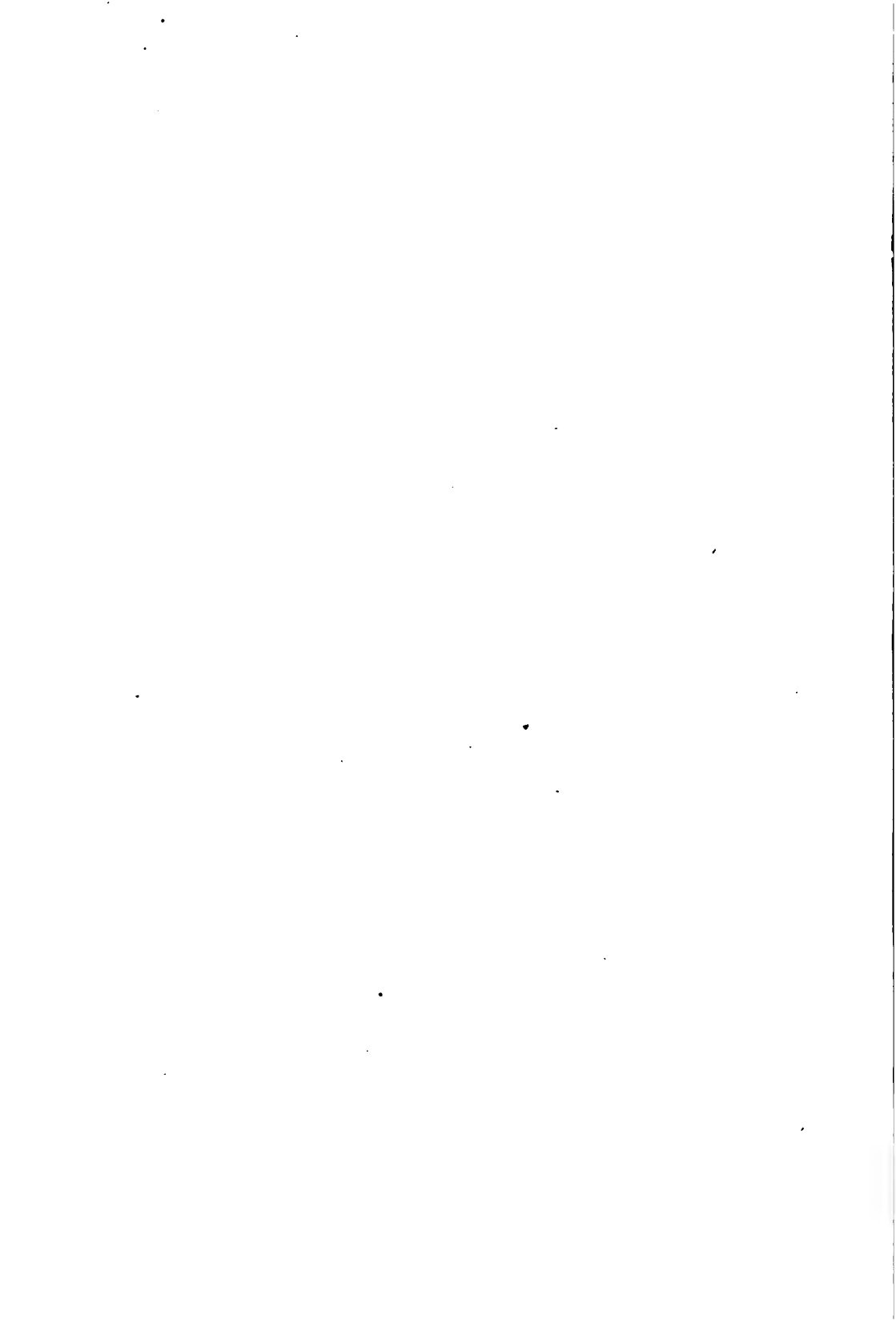
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FROM THE LABORATORY OF PROFESSOR AND HEAD OF
DEPARTMENT E. FUCHS.

THE ZONULA CILIARIS
AND ITS
RELATION TO NEIGHBORING STRUCTURES.

AN ANATOMICAL STUDY

BY

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OF VIENNA.

With Twenty-one Text Figures.

AUTHORIZED AND CORRECTED TRANSLATION

BY

E. V. L. BROWN, M. D., CHICAGO, U. S. A.

NOTE.—While I was engaged in working over a few chapters of the normal microscopic anatomy of the eye last summer (for the "Encyklopedie der Augenheilkunde," by Dr. O. Schwarz, Leipsic), I made more use of the older methods of pure anatomical preparation than one usually does nowadays. I can probably attribute the fact that I discovered the insertion of the zonular fiber-bundles into the anterior border layer of the vitreous to this fact, and thereby found the stimulus for the work at hand. In following these things further I soon came upon other interesting and new anatomical details, and found myself compelled to extend my study to the vitreous and pars ciliaris retinae. This little anatomical study which I herewith commend to the reader arose in this way; for the material I am indebted to Prof. Fuchs, in whose laboratory the studies were carried out.

The accompanying text figures are as good as original drawings; I have drawn them myself on "Kornpapier," and for the excellent reproductions I am indebted to the art firm of C. Angerer and Goeschl, Wien.

Wien, September, 1900.

THE AUTHOR.

- I. The Zonular Fibers.**
- II. The Union of the Zonula with the Lens Capsule.**
- III. The Union of the Zonula with the Pars Ciliaris Retinae.**
 - A. The Structure of the Pars Ciliaris Retinae.**
 - (1) The Outer Glass Membrane.
 - (2) The Pigment Epithelium.
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 - B. The Union of the Zonular Fibers with the Pars Ciliaris Retinae.**
- IV. The Vitreous and its Relations to the Zonula.**
 - A. The Structure of the Anterior Segment of the Vitreous.**
 - B. The Union of the Vitreous with the Inner Glass Membrane of the Pars Ciliaris Retinae.**
 - C. The Union of the Vitreous with the Lens Capsule.**
(Ligamentum hyaloideo-capsulare.)
 - D. The Union of the Vitreous with the Zonula.**
- V. Topography and Arrangement of the Zonula.**

I. THE ZONULAR FIBERS.

The fibers which make up the zonula have a peculiar place among the tissue elements; they are colorless, moderately refractile structures with exactly parallel contours, and therefore appear bandlike; and, too, they are unlike all other fibers in their perfectly straight non-undulating course.

Under normal relations there are no nuclei in the fibers, and no nucleated cells applied to them as in the fibrillae of ordinary connective tissue.

The fibers vary greatly in size; for instance, those uniting the larger fibers with the corona ciliaris are so fine that they cannot be accurately measured, while at the orbiculus ciliaris there are fibers that measure as much as 0.035 mm. in width. The larger fibers are doubtless made up of finer ones. One must look upon this union as a fusion of the respective fibers with one another, and not simply as a cohesion of fibers, for the larger fibers appear homogeneous, and only faintly marked longitudinally coursing furrows indicate their real composition.

The optical section through the length of such a fiber therefore shows a fine longitudinal striation, and the cross-section an irregular crenation of its border.

One may define the finest fibers, i. e., those which do not undergo any further subdivision, as primitive fibrillae, and the largest fibers as fused bundles of such fibrillae. However, the primitive fibrillae are not of uniform size throughout.

The larger fibers are either disposed in strata, as in the ciliary valleys, or in the form of brushes, as in the free portion of the zonula between the ciliary processes and the lens.

However, one cannot make a sharp distinction between bundles and individual fibers. A larger fiber cannot be looked upon as a unit in the sense that a cross-striated muscle fiber is a unit. A large fiber can divide into, that is, be replaced by a tiny bundle of smaller fibers without losing its morphological or mechanical importance or changing its nature in any way; and it is idle to speculate at what point fibers break up into their elements, for this occurs at one place in one eye and at another place in another eye. Moreover, false anastomoses arise when a fiber fuses with its

neighbor on the left for a distance, and then with its neighbor on the right.

The separation of a large fiber into its fibrillae occurs in different ways. Near the lens the fiber splits into a brush of fibrillae, whereas at the ciliary end one fibrilla after another splits off from one side of the large fiber, and the whole looks like the shaft of a feather with the ribs cut away from one side.

This is the only difference between the attachment of the fibers peripherally (outward) to the wall of the eye, and centrally (inward) to the lens and vitreous, and this difference is not a marked one. The peripheral attachment is usually spoken of as the origin, and the central attachment as the insertion of the fibers, but such a conception appears to me to be thoroughly artificial, at least from an anatomical standpoint. If the zonula was united with only the ciliary body and lens, there would be nothing against such a terminology, but the connection of the zonula with the vitreous alters the case entirely.

The zonular fibers are closely related to elastic fibers in their microchemical nature, although they possess, according to Agababow (1), less resisting power to chemical reagents, possibly from their isolated position. In general, I can find nothing characteristic about the staining power of the zonular fibers. They give only a faint diffuse, i. e., connective tissue or protoplasm color-reaction as a rule, and a pure nuclear stain does not color the zonular fibers in any way. Mallory's phosphomolybdic acid hematoxylin, which I have found most satisfactory in my studies, cannot be looked upon as a special zonular fiber stain, because it stains all other fibers with an equal intensity. After trying many stains, Agababow comes to the conclusion that the zonular fibers are closely allied to neuroglia as well as to elastic tissue, and bases his conclusions upon the positive results with the respective elective stains. I cannot corroborate his conclusions with respect to the latter: Two excellent stains for elastic tissues, namely, orcein and resorcin-acid fuchsin are negative for the zonular fibers. It is true they stain them somewhat, but not any more than they do the lens capsule, and perhaps never so strongly as they do Descemet's membrane. Such a reaction cannot be called positive for the zonular fibers; fibers of their size should

appear deep black if they were as well stained as the elastic fibers in the sclera or the intima of arteries.

It is indeed otherwise with Weigert's neuroglial stain; the reaction is, as Agababow says, positive. Cell nuclei and, at least in my specimens, the sclera are also stained. But I consider it entirely wrong to ascribe a neuroglial nature to the zonula on this ground. A positive staining reaction indicates nothing whatever concerning the physical nature or origin of a histological element; it belongs only to the properties of the affected tissue element, but acquires no higher significance than a purely morphological property. There are more weighty considerations which speak against the zonula as modified neuroglia; these grounds lie in the attachments of the zonula to the surrounding structures which, in my opinion, are of special importance for the position of the zonula in the histological system as well as for its classification upon an embryological basis.

The zonula ciliaris is united to three structures, namely, the *lens capsule*, the *limiting membrane between the retina and the vitreous*, which is known as the *hyaloidea* in the region of the *pars optica retinae* and in the region of the *pars ciliaris* as the inner glass membrane, and the *vitreous* itself.

II. THE UNION OF THE ZONULA WITH THE LENS CAPSULE.

Undoubtedly the relations are the simplest and easiest to understand at this point; it is therefore more to the purpose to begin with the description of this attachment, although one is accustomed to call this the insertion of the zonula in the prevailing terminology.

The zonular fibers are attached to the lens capsule at very different angles; the marginal fibers, that is those adhering to the very borders of the zone of the capsule to which fibers are attached, course tangential to the capsule, while the middle fibers course toward the capsule at right angles to the surface. A further difference between the marginal and middle fibers is the following: The former retain a certain size until they reach the immediate neighborhood of the capsule, where they become somewhat bandlike, and only first subdivide into their ultimate slightly divergent fibrillae after they have become fused to the capsule; the

middle zonular bundles, on the other hand, divide into their primitive fibrillae before they reach the capsule, and show no further subdivision on the capsule. The above statements concerning the marginal fibers hold good for the posterior bundles as well as for the anterior bundles, but are more easily demonstrated in the latter because the individual fibers are of greater size. The zonular fibers only fuse with the outer part of the capsule, and do not enter

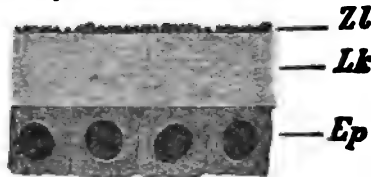


FIG. 1.—Equatorial zone of the lens capsule; frontal section. Magnified 540 times. Zl—Zonular lamella. Lk—Lens capsule. Ep—Epithelium.

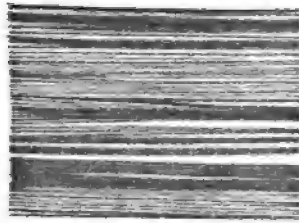


FIG. 2.—Zonular lamella of the lens capsule within the insertion zone of the zonula. Surface preparation. Magnified 300 times.

Fig. 2 shows a surface view; the stripes are of unequal width and almost entirely parallel. Fig. 1 shows a view of the stripes on cross-section as they appear in the frontal section through the equatorial zone of the lens capsule. With a low power the outer surface of the capsule is granular but by a higher magnification one can clearly see the individual zonular fibrillae; they merely cling to the capsule, and, as a rule, stain more intensely than the capsule itself.

into the substance of the capsule. Therefore, the fibers which lie nearest to the margins of the zonula can be followed for a relatively long distance over the capsule and determine a fine but not entirely uniform meridional striation over the whole zone of attachment as noted by Oskar Schultze (2).

The fixation of the zonular fibers to the lens capsule

appears to be a very firm one, in any case it is more firm than the cohesion of the various capsular lamellae, for one can easily detach the outermost lamella as an extremely fine membrane of immeasurable thickness in which the zonular fibers lie. Berger (3) isolated this membrane by maceration and called it the zonular lamella of the capsule; Retzius (4) speaks of a pericapsular membrane with which the zonular fibers fuse. The membrane does not need any special preparation, for one sees it detached very frequently in microscopical preparations and, indeed, most marked in the region to which the equatorial zonular bundles are attached, and less plainly where the bundles in front and behind the equator are attached. It is apparently the pull of the zonular bundles which causes the elevation of this membrane; however, this more marked equatorial separation does not mean that the pull upon the lens capsule is the greatest at this point, but only that here the pull works in the most effective manner, namely, at right angles to the surface of the capsule. But any judgment concerning this formation in hardened preparations must be formed with great care. The lens shrinks more or less in the various hardening fluids, and this must naturally increase the tension of the lens and zonular apparatus. Such an elevation of the membrane, or a detachment of the entire capsule does not indicate in any way that there was a pull that was effective during life. The tension, upon which at least one author (Schoen) lays such great stress, first occurs in the fixation fluid.

The space between the detached zonular lamella and the capsule is rarely crossed by fine threads which run in the direction of the zonular fibers, i. e., at right angles to the surface. In a casual study, one gets the impression that the zonular fibrillae are continued through the zonular lamella to the capsule proper. With higher magnification, however, one sees that on the one hand all the zonular fibrillae bend about into the zonular lamella, but that, on the other hand, the threads lying between the zonular lamella and the capsule, do not possess, throughout, the regular contour of the zonular fibers. They are irregular, unite with each other in places, etc., and the whole looks more like a sticky mass drawn out into threads. An

extremely delicate layer of fibers is found on the outer surface of the zonular lamella; this is in connection with the vitreous and will be discussed more in detail further on.

The attachment of the zonular fibers to the lens capsule may be accordingly spoken of as a wholly superficial, but, nevertheless, very firm union.

III. THE UNION OF THE ZONULA WITH THE PARS CILIARIS RETINAE.

A. The Structure of the Pars Ciliaris Retinae.

The pars ciliaris retinae is the most important region of origin for the zonular fibers, and, according to some authors, the only region of origin; it is therefore necessary to discuss the structure of this part of the retina first.

The expression, pars ciliaris retinae, is used by authors in various senses; some on the one hand refer to both the pigmented and unpigmented layers, and others, on the other hand, refer only to the unpigmented layer. I follow the first usage, and define the pars ciliaris retinae, therefore, as that portion of the epithelial lining of the inner surface of the ciliary body arising from the secondary optic vesicle.

Accordingly, it consists of two layers, one arising from the outer, and the other from the inner layer of the secondary optic vesicle. Both are developed as single layers of cells, and it only appears to have several layers of cells where folds of invaginations have formed.

The outer layer is pigmented throughout and is a direct continuation of the pigment epithelium of the retina. The inner layer is unpigmented as far forward as the anterior slope of the ciliary processes and can probably be best looked upon, as first held by Schwalbe (5), as a layer of undifferentiated cells, i. e., cells which did not develop into nerve elements or supporting nerve tissue, but remained in an earlier stage of development.

The pars ciliaris retinae is separated from the adjacent tissues by homogeneous membranes, one separating it from the connective tissue of the ciliary body, the outer glass membrane, the other separating it from the vitreous and orbicular space, the inner glass membrane.

In the detailed description of the pars ciliaris retinae, we may therefore consider the following structures in their order from without inward: the external glass membrane, the pigment epithelium, the unpigmented epithelium, the internal glass membrane.

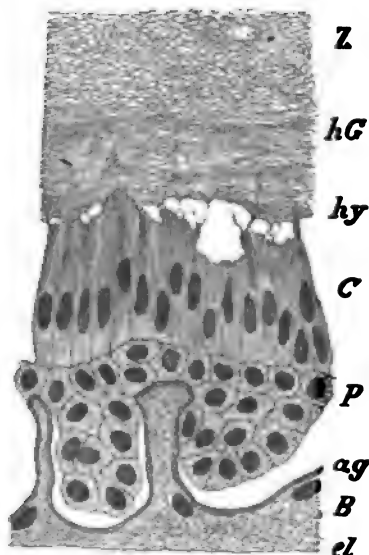


FIG. 3.—Pars ciliaris and vitreous in the posterior part of the orbiculus ciliaris (in the neighborhood of the ora serrata retinae); large mesh zone of the reticulum of the outer glass membrane; equatorial section, bleached. Magnified 400 times.

hG—Posterior border layer of the vitreous; note above the loose fiber system spreading out into the body of the vitreous; in it are seen a few fine zonular fibers on cross section; (Z) below, toward the pars ciliaris retinae, the vitreous is bordered by the hyaloidea (hy).

C—Inner unpigmented epithelium, consisting of high cylindrical cells.

P—Bleached pigment epithelium with very plain cell borders and granular protoplasm.

ag—Outer glass membrane.

B—Avascular connective tissue with a few nuclei close to the glass membrane.

el—Elastic lamella.

1. The Outer Glass Membrane.

If one traces the outer glass membrane backward, he finds that it goes over into the glass membrane of the chorio-

idea (lamina vitrea, elastica or basalis chorioideae) without a break. But on the other hand, it is incorrect to say that the glass membrane is continued forward into the corpus ciliare. A more accurate study of this membrane shows that it is made up of two lamellae, as described by Sattler (6), and recently by Smirnow (7), who has shown even a greater difference between the two lamellae by the orcein stain.

According to Sattler, the glass membrane of the chorio-

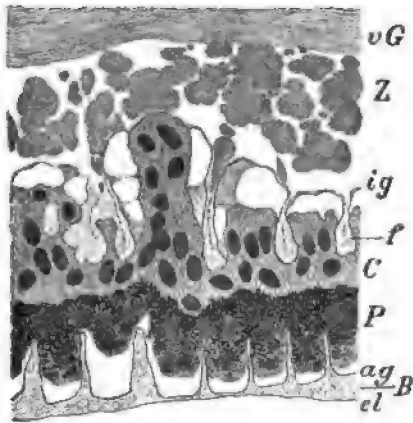


FIG. 4.—Pars ciliaris retinae and zonula in the anterior part of the orbiculus (small mesh zone); equatorial section. Magnified 400 times.

vG—Anterior border layer of the vitreous.

Z—Zonular fibers in cross section.

ig—Inner glass membrane which sends numerous thick folds (f) into the inner unpigmented epithelium (C); one sees fine zonular fibers in the folds.

P—Pigment epithelium.

ag—Outer glass membrane.

B—Avascular connective tissue; fibers in cross section.

el—Elastic lamella.

idea can be split into two lamellae, an inner, that is entirely structureless, except for the verrucae which it frequently shows in advanced years, and an outer, which is covered with a delicate clear lattice-like mesh work. Smirnow has shown that this mesh-work contains an extremely fine net of elastic fibers. I have never succeeded in staining the elastic network as plainly as Smirnow draws it, but there

is no doubt that the outer lamella stains more heavily with the orcein and resorcin-acid fuchsin (Weigert) than does the inner one.

Both lamellae are to be made out best in the neighborhood of the disk, where both, and especially the outer lamella, are thicker. When one treats sections from this region with the above named elective stains, the inner lamella is unstained and the other is amply stained.

As one follows the glass membrane toward the ciliary body, a layer of wavy connective tissue appears between the two lamellae, as a rule even before the end of the retina is reached. This layer is especially well developed in that part of the orbiculus ciliaris in which gland-like evaginations lie, and is a pretty dense tissue with meridionally coursing, uniformly undulating fibers.

Van Gieson's stain colors this connective tissue a deep fuchsin red somewhat as it does the sclerotic tissue in the ciliary processes, while the glass membrane is unstained or clear red. Nuclei are present in small numbers along the inner side toward the glass membrane (Fig. 3); vessels on the other hand fail completely in this layer under normal conditions.

This connective tissue layer exists throughout the whole of the ciliary body, so that the two lamellae of the glass membrane which it separates at the fore end of the chorioidea, are not again united. This relation is disturbed only in a few places, which will be considered more fully in connection with the "glands" of the pigment epithelium.

The outer lamella of the glass membrane can be followed over the entire orbiculus into the corona ciliaris, where it gradually disappears without any special limitation. It is composed throughout of a simple net of elastic fibers (Figs. 3 and 4) apposed side to side in one tissue plane, and which give an excellent elastic tissue stain; this net shows as a sharply delineated, highly refractile line in meridional sections, even when stained in the ordinary way. It is closely applied to the vessel layer of the ciliary body, and forms projections only together with the vascular layer. This elastic net has nothing to do with the reticulum of the glass membrane about to be described.

The inner lamella of the glass membrane of the chorioidea, that which does not take the elective stain for elastic fibers, alone becomes the glass membrane of the ciliary body, or the

outer glass membrane of the pars ciliaris. I prefer the latter term, first in order to distinguish it from the inner glass membrane, and second, because it probably is more nearly related to the pars ciliaris retinae than to the pars uvealis corporis ciliaris. And, if one may look upon the other glass membranes of the eye as cuticular structures, one may as well ascribe a similar origin to this membrane.

There is very little that is characteristic about its staining relations; it has already been noted that it does not give the color reaction for elastic tissue. Diffuse stains as a rule do not bring out this membrane adequately, and only ammonium carmin gave in my hands a stronger stain than connective tissue did. Occasionally, van Gieson's gave a very clear stain, but only in places where the membrane was bordered by dense sclerotic connective tissue which stained a brilliant red in contrast with the faint rose red of the membrane. Finally, in bleached sections it shows a greater affinity for hemalaun than for eosin or ammonium carmin, and takes on a more violet tone.

In the region of the orbiculus ciliaris the outer glass membrane is thin and delicate, but in the neighborhood of the ciliary processes it often attains a thickness of 0.01 to 0.012 mm., therefore, a measurement which is found at the end of Descemet's membrane.

Of special importance is the system of folds and ridges described in a classical way by Heinrich Mueller, and called by him the reticulum (Fig. 5 and 7).

In order to get a good view of this reticulum, surface preparations are necessary throughout. One removes the retina and vitreous from the fresh eye, or an eye preserved in weak formalin; the zonula regularly comes away with these structures, and the pars ciliaris retinae is thereby more or less detached.

Then one frees the uvea from the sclera and removes as much as possible of the ciliary muscle and the vessel layer. The preparation then consists only of the layers so far described, namely, the elastic fiber net, the layer of vesselless connective tissue, and the outer glass membrane; pigment detritus often clings to the latter, but since this happens only in the larger meshes of the reticulum, it really does not interfere with the study of the reticulum, and, indeed, rather makes it come out more clearly.

When the pars ciliaris retinae becomes detached, sections through the ciliary body are of advantage; this is a frequent finding in cadaverous eyes. In such preparation one can study the tips of the ridges under the best of circumstances. When the pars ciliaris retinae is united to the outer glass membrane, these ridges are hard to make out since they project between pigment epithelial cells, and are for the

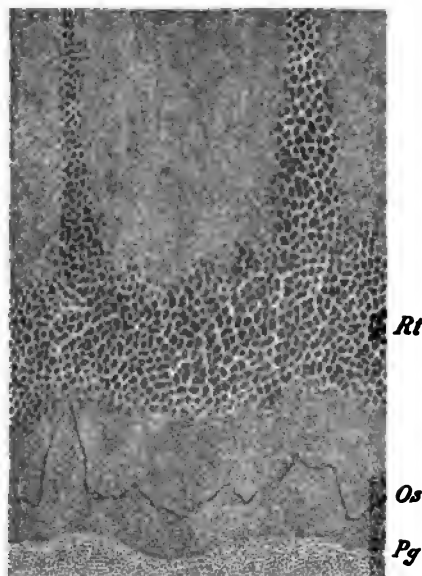


FIG. 5.—Surface view of the pigment epithelium of the orbiculus ciliaris. Magnified 32 times.

Pg—Border between the pigment epithelium of the retina and that of the orbiculus ciliaris; it forms an irregular, wavy line.

Os—Ora serrata retinae with two teeth.

Rt—Large mesh-zone of the reticulum of the outer glass membrane drawn forward in stripes corresponding to the retinal teeth.

most part covered over by them; bleached specimens do not improve the situation essentially.

The reticulum of the outer glass membrane is mainly to be found over the orbiculus ciliaris; it is absent, however, for a zone of some 0.6 mm. width in front of the ora serrata. Moreover, on the ciliary processes, where the membrane is especially thick, there is no real reticulum, but only insig-

nificant inequalities in the surface of the membrane. Variations among individuals and in different ages are very great; the reticulum is very poorly developed in children and young people, and is best seen in those over 40 years of age.

The surface of the reticulum exhibits a series of ridges of 0.002 to 0.006 mm. (or seldom greater) width, having a homogeneous appearance, or, when somewhat thicker, a striated appearance, and arranged in more or less regular,

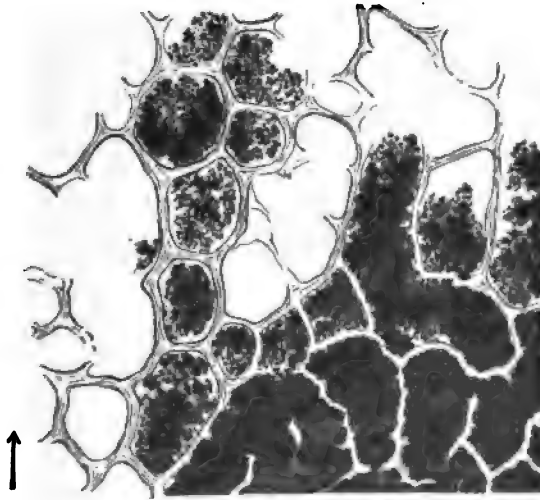


FIG. 6.—Large mesh-zone of the reticulum of the outer glass membrane; surface view; pigment fragments in part of the meshes. The arrow below to the left points forward, and gives the direction of the meridian. Magnified 240 times.

rounded or polygonal meshes which remind one of plant cells or honeycomb.

One can distinguish two types of such meshes; large ones with a diameter of 0.04 to 0.05 mm. (Fig. 6), and small ones with a diameter of 0.01 to 0.02 mm. (Fig. 7). The former are found mainly at the posterior part of the orbiculus ciliaris, and are separated from the ora serrata only by the above mentioned smooth zone. When well developed, they form a closed zone of 1 mm. or more width (see Fig. 5) which

even macroscopically, attracts one's attention by its dark color, and shows a dentate border corresponding to the outline of the ora serrata or at least meridional stripes coursing toward the corona, and corresponding to the teeth of the ora. In the majority of cases the large meshes are better developed over the broader parts of the ciliary body, lateral and inferior, than over the opposite portions, where at times, indeed, they fail completely.

The small meshes (Fig. 7) are especially to be found in

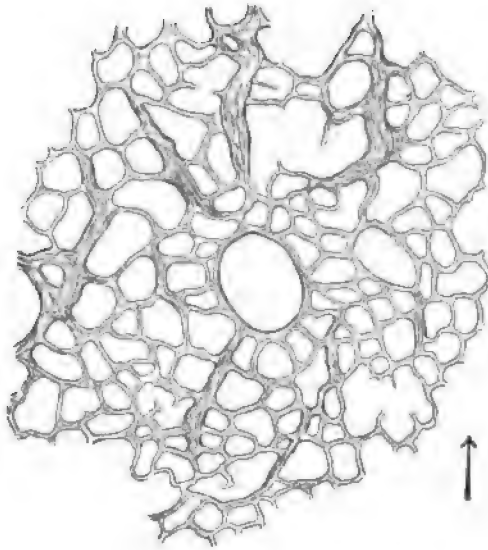


FIG. 7.—Small mesh-zone of the reticulum of the outer glass membrane; surface view. The arrow points forward. Magnified 290 times.

the fore part of the orbiculus ciliaris and in the posterior part of the corona. The small meshes are not so united into a closed net, and one often finds only meridionally placed ridges, which, with the gradual decrease in the height of their branches, remind one of huge bone-corpuscles (H. Mueller); individual ridges are always more prominent through their greater height and thickness.

The reticulum is most strongly developed in the little folds which occur at the border zone between the orbiculus ciliaris and the corona, and in the posterior part of the

ciliary valleys; here the ridges are especially thick and plump, the meshes narrow and deep. In general, it may be said that these little folds are principally due to a localized stronger development of the reticulum and of the connective tissue layers on the outside of the outer glass membrane.

A section, either meridional or equatorial, through places where the pigment epithelium is detached, shows that the meshes of the reticulum form little box-like baskets, or cavities, that are almost as deep as they are wide. The free borders are sometimes straight, sometimes slightly concave, or, when they unite ridges of unequal height, oblique; here and there they are dentate (see Fig. 8). In the large meshes, one often sees the free borders of the ridges pressed



FIG. 8.—Small meshes of the reticulum of the outer glass membrane (*ag*) in profile, and the somewhat detached pigment epithelium plugs (*P*) sticking in them. Equatorial section. Magnified 360 times.

down and flattened out, so that the cross-section of a ridge has the form of a letter T (Fig. 3). This then gives the impression that the inner opening of the tiny cavity, vitreousward, is narrower than the cavity itself; however, it is possible this is in many instances only due to the obliquity of the sections.

On cross section, the smaller ridges appear to consist only of the glass membrane; those of larger meshes, on the other hand, are filled out in part by the avascular connective tissue which lies just external to the glass membrane. In many places the reticulum looks as though it was formed by a mechanical folding of the glass membrane, but these folds are so fixed in their union into meshes, that no sort of tension could flatten them out, and it follows that they could

not have arisen by tension. It is incorrect to conceive of them as wrinkling of the inner surface of the ciliary body brought about by contraction of the ciliary muscle.

The outer glass membrane forms a sharp line of demarcation between the epithelium and the connective tissue. Inside the membrane, not a single connective tissue fiber is to be seen; if they were present they would stand out as clearly as does the connective tissue framework of a sarcoma. A connective tissue mesh or trabeculum going out from the connective tissue of the ciliary body, and going in between the cells of the pars ciliaris, as contended for by Topolanski (11) certainly does not exist, and indeed, such a conception is not in agreement with our other conception of an epithelium.

2. The Pigment Epithelium.

(Figs. 3, 4, 8; P.)

The pigment epithelium of the pars ciliaris is, as already stated, a direct continuation of the pigment epithelium of the retina, and has in general the same character. However, the ends of the cells present a straight border, and the pigment granules are roundish.

The pigment epithelium cells of the pars ciliaris differ from their neighbors in the pars optica retinae in form and size. They are narrower (0.006 mm.) and higher (0.023 mm.) than these, their nuclei are oval, and are placed with their long axes at right angles to the wall of the eye. Yet this is true only for those parts which form the smooth and uniform single cell layer, i. e., for the narrow zone immediately in front of the ora serrata, to which corresponds the smooth outer glass membrane. It is the greater height of these cells which makes the inner surface of the ciliary body so much darker than that of the chorioidea. And where gland-like indippings are added to this, the color is just so much the darker. Only the cells on the crests of the ciliary processes are lower (0.01 to 0.015 mm.) and less pigmented, so that the crests stand out sharply as white stripes.

All meshes of the reticulum of the outer glass membrane are filled out by the pigment epithelium. The outer surface of the pigment epithelium shows the same number of rod-form projections as the reticulum has depressions, as is

very well shown in Fig. 8. There is room for perhaps only two or three cells in one of these small meshes, and they are therefore filled out by somewhat elongated (0.02 to 0.04 mm.) pigment epithelium cells. The larger meshes, on the other hand (Fig. 3), take up so much room that the pigment epithelium cells can group themselves along the sides of the wall in a continuous layer, and the whole structure becomes very much like the acinus of a gland. Treacher Collins even ascribes to them a lumen. I have also seen a little depression in the middle of many such "glands," that is, a shallow outward displacement of the border line of both layers of epithelium, but I am not able to recognize genuine lumina inside the "glands." In any case if such a lumen is present, it must be closed by the inner unpigmented layer of epithelium. Inside the "gland," the cells are more cubical, that is, not stretched out in any direction. But the cells over the crests of the ridges which unite the neighboring meshes, show the same form (Fig. 3), so that an essential difference between the "gland cells," and those of the surface epithelium does not exist. Of course, in places where individual "glands" are enclosed within the small mesh zone at the posterior margin of the corona ciliaris, the difference in the shape of the cells is striking. When a closed larger mesh-zone is present along with a zone of "glands," the pigment epithelium layer is considerably thickened (to 0.06-0.08 mm.) by the closely compressed "glands."

Since this thickening occurs only toward the inside (the elastic lamella courses smoothly and evenly over the outside of the large mesh-zone) and since over this area the inner layer of the epithelium is especially thick, the large mesh-zone forms a low flat tumefaction on the inner surface.

Especially long (to 0.08 mm.) and narrow (0.03 mm.) "glands" arise in the narrow thick walled meshes of the reticulum which forms the little folds at the margin of the corona ciliaris and orbiculus ciliaris.

In general, these "glands" do not reach deeper than up to the elastic lamella, which forms the extension of the outer lamella of the glass membrane of the chorioidea. Here and there, however, there are "glands" which perforate this lamella, and press into the vessel layer of the ciliary body, although they are, of course, ensheathed by the outer glass membrane.

Under normal conditions, the cells of this layer are so filled with pigment, that one can recognize neither the cell borders nor their nuclei. Sometimes the pigment in the outer end of the cell is a little less dense, as shown in Fig. 4. In order to see the form and arrangement of the cells, it is unconditionally necessary to bleach the sections. I myself have used the method of Fick (concentrated solution of bichromat of potassium, to which one-third the volume of thinned sulphuric acid is added) and have been satisfied with it in every way. In sections bleached in this way, the cell borders stand out in a most striking manner. In a still more notable manner this is true of the borders of the cells turned toward the inner unpigmented layer of the cells. These borders, which represent the collapsed and completely adherent walls of the primary optic vesicle, stand out as a sharp line which courses over the ridges of the reticulum a slight distance removed from the surface, and in an almost straight line. Only over the large "glands" these borders are somewhat bayed out and the especially marked folds correspondingly displaced inward. But it can always be shown that the folds of the reticulum do not reach vitreousward to this border between the two leaves, but that the apices of the folds are covered over by pigment epithelium. Figures 3 and 8 show this so plainly that I can spare myself all other discussion of this point.

3. The Inner Unpigmented Layer of Cells (Figs. 3 and 4; C).

This layer is most marked by its absence of pigment. Only over the most anterior declivities of the ciliary processes, in the neighborhood of the root of the iris is this layer pigmented. This place, however, has nothing more to do with the zonula, and so has no further interest for us.

The form and size of the cells vary in the different parts of the ciliary body. In the region of the large mesh-zone of the outer glass membrane (Fig. 3) especially high slender cylinder cells are present (height 0.04-0.06 mm., breadth 0.009). Between this zone and the ora serrata they are somewhat lower, and also where the large mesh-zone is absent, they do not attain the above height. From the anterior border of the large mesh-zone toward the corona

ciliaris, the height of the cells gradually decreases, and over the processes the cells are cubical, or almost as low as broad (height 0.01-0.015, breadth 0.012-0.015 mm.).

The form of the nucleus corresponds to that of the cell. In the cylindrical cells it is rather long, in the lower cells rounded. The cells are closely apposed, but as a rule they are not united with the pigment epithelium over the whole basal surface, but only at particular points between which there then remain small vacuolar spaces. The more these spaces are distended, the more the stilt-like form of the points of attachments stands out (Czermak, 13).

This layer in general is developed as a single stratum without irregularities, except in so far as these are caused by the layers which lie outside of it. Yet here and there, projecting duplications are found in the anterior part of the orbiculus, and in the corona ciliaris. Fig. 4 shows such a fold in cross section; the cells lie in two not wholly distinct rows, and the cap of the fold springs almost as far again inward as does the neighboring line of the cells. The relations of these folds to the ridges of the inner glass membrane are apparent. They give the impression that the inner layer of the cells is a little compressed by the two neighboring ridges of the inner glass membrane, and that they therefore project a little over the usual level of the layer. In longitudinal sections, the folds appear drawn out to correspond with the origin of the zonular fibers.

But the ridges of the inner glass membrane (concerning which there will be a more accurate account later) also call forth other irregularities in the unpigmented layer of cells; these are also best seen in an equatorial section (Fig. 4). One notes especially that smaller and lower cells lie below the caps of the folds of the inner glass membrane. It is self-evident that these irregularities will be just so much more prominent, the thicker the ridges of the inner glass membrane are. Perhaps these folds of the unpigmented epithelium in general are only appearances due to age. My studies do not permit me to give a final judgment in this matter.

In any case, we are here dealing with a territory in which more accurate study is very much demanded—I mean the changes brought about by age in the pars ciliaris retinae; and pathologic states of the same. It is not yet certain what one

is to look upon as physiological, pathological, or as artefact of the hardening. The point of view of Schoen, who would explain everything through the pull of the zonula or over-active accommodation, is decidedly too one-sided.

Especially in the eyes of older individuals, changes in the unpigmented cell layer are not frequent. The cells are bent and oblique, and often turned forward, although in places they bend backward. Changes in the protoplasm of the cells, and the formation of vacuoles in and between the cells are frequent findings. Part of the irregularities visible on meridional sections are to be explained, of course, by the already reported fold-formations. The longitudinal sections of the folds show the epithelium in several layers, and if an obliquely directed section cuts through the crest of such a fold, a second layer of cells appears to lie over the normal layer and its inner glass membrane.

Despite all these changes, which more or less give one the impression of being pathological, I think the following can be said with complete exactitude; aside from the ridges of the inner glass membrane, which will be spoken of in the next chapter, *the inner unpigmented epithelial layer consists throughout of uniformly formed elements, and indeed of cells only.* I can neither corroborate the existence of nucleated supporting fibers, as reported by Berger, nor a non-nucleated framework as given by Terrien (14).

1. The Inner Glass Membrane.

(Figs. 3 and 4; ig.)

Of all of the structures to be reckoned to the pars ciliaris retinae, this structure has the greatest importance for the anatomy of the zonula. It is the main region of origin for the zonula.

The inner glass membrane is a delicate homogeneous membrane which covers over the entire inner surface of the pars ciliaris retinae, and probably also extends over on to the posterior surface of the iris epithelium. Behind, it goes over into the hyaloidea, or, as others call it, the limitans interna retinae. In any case, apparently the same thing is said. Yet anatomists have always been at war over this point, whether one shall reckon the limiting membrane between the vitreous and the retina to the first or to the last.

I do not feel myself called upon to settle this question. And such a judgment would be without significance for my purposes here. This much is certain, that the inner surface of the pars optica retinae, as well as that of the pars ciliaris retinae, is covered over by a continuous homogeneous membrane. And in the region of the pars optica retinae, and in the narrow zone of some 1.5 mm. breadth in front of the ora serrata, this membrane is at the same time the border layer of the vitreous. Further forward the zonula comes in between the membrane and the vitreous, so that it from there on appears to belong to the pars ciliaris retinae, and not to the vitreous any more. A splitting of this membrane in the ora serrata, as now generally recognized, is not present.

I think in general that the finer anatomical structures of this membrane will be better presented if I denote the point at which the inner glass membrane of the pars ciliaris becomes the hyaloidea as not the ora serrata itself, but as a point not quite 1.5 mm. in front of it (Fig. 11, 20; hy.). For from here backward this membrane has all the characteristics of the hyaloidea itself. It clings much more firmly to the vitreous than it does to the pars ciliaris retinae, and can be easily shown. When one separates the retina from the ora serrata in a hardened eye (the method of preparation for which will be more accurately described later), this zone, together with the most posterior fibers of origin of the zonula, regularly remains fixed to the detached retina. I prefer to call this zone the ciliary zone of the hyaloidea. The pars ciliaris goes with it many times, not completely but only in part. However, it sometimes comes about that one is able to get a particularly clean detachment of the inner glass membrane. Also when one attempts to tear away the vitreous from the ora serrata, this most posterior zone of the inner glass membrane comes away with it. It is, of course, much more difficult to demonstrate this connection, because the vitreous tears from the retina. At least, one can afterward remove the retina from the preparation obtained in the manner first described. On account of the brittle structure of this membrane (I always speak of eyes hardened in Mueller's fluid) this is very easily done. Such a preparation is drawn in Fig. 9. The hyaloidea proper, i. e., the border membrane between the vitreous and pars optica retinae, is omitted, because it does not interest us further.

Such a preparation shows with absolute certainty the continuity of the hyaloidea and the inner glass membrane of the pars ciliaris retinae, which, despite of all the irregularities of the margin of the retina, is still preserved. It shows, too, how completely the anterior margin of the ciliary zone reproduces the dentate form of the ora serrata, not only in so far

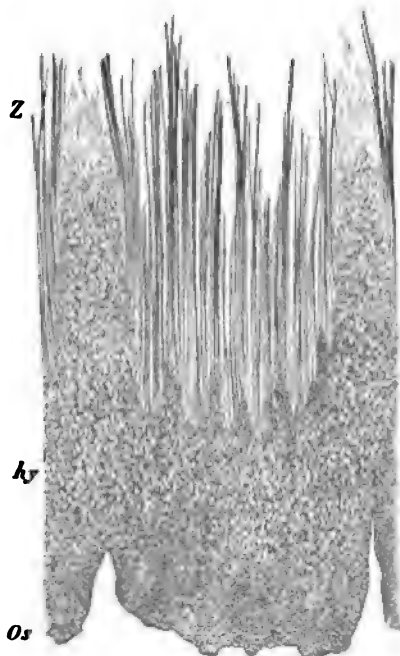


FIG. 9.—Ora serrata retinae, ciliary zone of the hyaloidea, and posterior border of the zonula in surface glass preparation. Magnified 26 times.

Os=Ora serrata with two teeth.
hy=Ciliary zone of the hyaloidea.
Z=Zonula fibers.

as the larger teeth are concerned, but also the smaller irregularities. I will return to this subject later.

The ciliary zone of the hyaloidea is seen to present on its surface a characteristic relief which is difficult to describe and still more difficult to depict, although very characteristic. In the first place, one notes things which are recognized at once as precipitate granules and little clumps of varying form and

size, especially immediately in front of the ora serrata. Farther forward there appears an irregular meshwork of ridge-like projections that may perhaps best be compared to waves on the surface of water, except that they are not very regular waves like those of a great body of water as the ocean, but like the more irregular waves which arise by the continuous reflection of water from the sides of a wash basin.

The sections show (Fig. 3) that these irregularities of the hyaloidea are not due to any system of ridges such as one finds in the outer glass membrane, but they arise from the fact that the hyaloidea clings to the inner layer of cells here and there, and is detached elsewhere. It is the more or less bowed outlines of the detached portions which give the membrane its similarity to the surface of water in motion. The spaces communicate with one another, and there is a slight mass of substance in them which often subdivides the cavity into thin-walled spaces. One gets the impression that other fixed points of the hyaloidea have been drawn out, or, as if a fluid had undergone transformation into a vesicular coagulum during the hardening; in short, the whole picture has the appearance of an artefact, or post-mortem development.

However, I think this much may be said with certainty: the ciliary zone of the hyaloidea clings much more loosely to the pars ciliaris than does the inner glass membrane proper, and is in general smooth, i. e., it does not send any ridges down between the cells.

But the portion of this membrane lying further forward, that is, the inner glass membrane in a strict sense, is characterized by the ridge-like projections between the inner colorless layer of the pars ciliaris, just as in the outer glass membrane.

This system of ridges attains its highest development in the anterior part of the orbiculus ciliaris, where the zonula not only takes many new fibers from the pars ciliaris retinae but also gives off many fibers to it. Here the ridges are plainly meridional in position: Here again, naturally enough, a surface preparation (Fig. 10) shows the arrangement and distribution of the ridges best. To obtain such a preparation, one separates the retina from the ora serrata in a fresh eye. Much more of the inner glass membrane,

and pars ciliaris retinae then comes away, than does in a hardened eye; and, indeed, the fouler the eye, the more easily and completely does the pars ciliaris detach, as Czermak has shown for the preparation of decayed material by Aeby's (15) method. One brushes away as many of the cells of the pars ciliaris as possible from the outer surface (although fragments of the unpigmented layer do not interfere with the examination) and mounts it with the outer surface up.

It is then seen that the ridges, as a whole, course meridionally, that is, parallel to the zonular fibers seen shimmering through the membrane from below. I say as a whole,



FIG. 10.—Inner glass membrane from the anterior part of the orbiculus ciliaris. Surface preparation. Magnified 300 times. The arrow shows the direction of the meridian.

for the ridges are not straight, but slightly zig-zag in form. The ridges lie partly isolate, and partly unite at acute angles. Cross anastomoses are not present. If we continue the comparison of these ridge systems with plant cells and compare the system in the outer membrane with a paronchym, we may then compare the system in the inner membrane with the prosenchym. To this one must make the limitation that the prosenchym of the inner ridges does not by any means form such a closed mesh system as does the reticulum of the outer glass membrane.

These differences in the two systems of ridges can also be brought out in sections. A section through the reticulum

of the outer glass membrane shows the same picture whether it be made meridionally or equatorially. The inner ridges, on the other hand, are to be seen very plainly on equatorial section, but only very poorly or not at all on meridional section.

An equatorial section (Fig. 4) shows the ridges (f) in cross view. After every group of three or four cells of the inner layer comes a ridge, and between the ridges the glass membrane is detached in a light bow form, thus presenting an almost regular row of delicate arcades of 0.03 to 0.05 mm. in width. It becomes evident that the ridges themselves are folds of the inner glass membrane which go pretty deep, but however, not clear to the border of the cell layer. The two leaves of the folds lie close together and include between them frequent cross or oblique sections of fine zonular fibrillae. The leaves of the folds are thicker than the free surfaces of the glass membrane, and the cross-section of the ridge acquires a more flask form or pear shape. This thickening is more marked in old people, and can go so far that the whole ridge looks spherical. The contrast between the slightly granular protoplasm of the cells and the completely hyalin structure of the glass membrane ridges is then especially striking. A good eosin stain colors the protoplasm rose-red; the ridges however remain almost colorless. Beneath the crests of the ridges, one usually finds a row of lower epithelial cells, although naturally in the section, only one cell is seen; between the folds, the cells are plainly cylindrical; sometimes a ridge will divide into two or more secondary ridges toward the free border. (Left side of Fig. 4.)

A meridional section of this region shows an wholly other picture: the beautiful arcades fail, and in their places are much longer, lower and more irregular ones. The ridges themselves, where slender, are quite invisible; where they are thicker they give one the impression that the cells have undergone hyalin degeneration, or that they are swollen and without nuclei for a distance.

Beneath the detached portions of the inner glass membrane one finds the same undefined substance mentioned in the discussion of the ciliary zone of the hyaloidea.

As already noted, the inner glass membrane clings to the

colorless epithelium. The ridges of it are firmly adherent to the epithelial cells, perhaps because of the thickening of their crests. When one attempts to tear off the epithelium which still clings to a surface preparation of the inner glass membrane, he is only partly successful, and notably the cells still cling to the sides of the ridges. And when in a hardened eye, the inner glass membrane elevates itself from the epithelium (which, indeed, rarely occurs) the ridges break off, their crests remain fixed among the epithelial cells, and the inner glass membrane only shows the bases of the ridges as low stumps. Fig. 14 shows the condition of the inner glass membrane under such circumstances.

The system of ridges of the inner glass membrane continues forward into the ciliary valleys and upon the lateral side surfaces of the processes; but upon the crest of the ciliary processes the ridges take on a cross arrangement which has been well compared by Ulrich (16) to the haustra of the large intestine. In general, the system of ridges is only well developed in the posterior portion of the corona ciliaris; in the forepart, the ridges are always more sparse and low; they are absent altogether anterior to the inner crest of the ciliary body.

The characteristic picture called forth by the inner glass membrane and its arcades has been reported by most of the authors, and in general, correctly described, yet many of them give more or less expression to the view that here we have to do with a sort of system of supporting fibers similar to the system of Mueller's fibers in the retina proper. I have already indicated repeatedly that I cannot convince myself of the existence of such a framework. Apparently, this idea is brought about by the fact that the ridges of the two membranes are opposed to each other. But the two systems of ridges are not united; the crests of the ridges are separated from the line which runs between the two cell layers by a narrow space; the width of this space can, however, always be measured (0.004 to 0.008 mm.). And for still another reason these systems of ridges cannot be the ends of a common frame-work the surface appearances are not similar. The large mesh-zone of the outer membrane corresponds to the ciliary zone of the hyaloidea; here the outer ridge system is very strongly developed, but

the inner fails entirely. And I have already especially emphasized the differences which the two systems show in the forepart of the orbiculus ciliaris.

And, even if there were such a frame-work permeating the whole of the pars ciliaris, there could be no analogy between it and the system of supporting fibers of Mueller; for these exist only in the retina, and end at the limitans externa, and therefore have no relation whatever to the pigment epithelium. The pars ciliaris retinae could only show such an analogy to Mueller's supporting fibers in the inner unpigmented layer of cells. Finally, the supporting fibers are nucleated cells; the two glass membranes, on the other hand, have the characteristics of cuticular structures to a marked degree.

B. The Union of the Zonular Fibers with the Pars Ciliaris Retinae.

The union of the zonular fibers to the pars ciliaris retinae in general, is effected only by means of finest fibrillae; only in the orbiculus ciliaris does it seem to me that larger fibers reach the inner glass membrane, but since no further subdivision of these fibers can be seen, it is probable one must look upon them, too, as elementary fibers. In this respect they differ from the fibers attached to the lens, for there the large fibers go over into the insertion surface, and first break up into fibrillae on the surface itself.

The angle which the zonular fibrillae make with the inner surface of the pars ciliaris varies a great deal. Throughout the orbiculus the angle is very acute, so that one may even speak of a tangential insertion of the fibrillae. In the corona ciliaris, however, many fibrillae are inserted at almost right angles to the surface of the ciliary body.

The zonular fibrillae can be followed outward only as far as the inner glass membrane and no further. The inner glass membrane is, therefore, to be looked upon as the insertion surface, or, if one prefer, the surface of origin, of the zonular fibrillae. In respect to the union of the fibrillae with this membrane, one can distinguish two types, i. e., union of fibrillae with the free surface, and union with the ridges of the membrane.

The first type is found in the ciliary zone of the hyaloidea

and in the region of the corona ciliaris. On surface preparations, one sees the finest fibrillae gradually become indistinct, and so go over into the hyaloidea without any relation to the relief or markings of this membrane whatever. Moreover, the fine fibrillae which unite the zonular fiber mass with the depths of the ciliary valleys and the side-surfaces of the processes, are frequently given off from places where no ridges of the inner glass membrane are found, and indeed, one sees many times that the area is slightly drawn inward at an angle, because the pull on the surface is almost at right angles to the surface.

The attachment of the zonular fibrillae to the ridges appears to me to be of much greater importance. I have already reported in the description of this structure (Fig. 4) that in the cross-section of the folds, zonular fibrillae lie between the two leaves of the ridges. One then sees as well on cross-sections as on longitudinal sections of the ridges, that these fibrillae show a very oblique direction, gradually reach the inner surface of the glass membrane, and then continue in the same direction to meet the larger zonular fibers. In longitudinal and oblique sections, when one cannot clearly make out the ridges, it looks as though the zonular fibrillae dip down into the layer of the cells, or originate in the spaces between the cells, as the case may be. However, a more accurate study shows that this pressing down into the inner cell layer is only apparent, that in reality, they remain separated from the cell-protoplasm by the inner glass membrane, and, when strictly interpreted, they only enter into union with the inner surface of the glass membrane; for the apposed and firmly adherent surfaces of such a fold in the glass membrane go over into normal-lying inner surface of the membrane on both sides (Fig. 4). The fibrillae do not lie singly, but are broadened out over the surface between the leaves of the folds in groups. Since they maintain the same direction after their exit, it comes about that a slender meridionally placed fan of zonular fibrillae emerges from each ridge.

There is no doubt that such an arrangement is especially well adapted for the fixation of the fibrillae to the pars ciliaris retinae. The fibrillae are clamped in, so to say, between two blades, and they certainly must hold better than

as if they were fixed to only one surface, as to the free surface. And, too, this arrangement guarantees a purely tangential insertion. Such an insertion would not be possible upon a concave surface, such as the inner surface of the pars ciliaris, if the main massing of the zonular fibers remained a little removed from the very surface. And the advantage of a tangential insertion is clear. The smaller the angle which a fiber makes with the surface into which it is inserted, the more firmly is it adherent. And, indeed, one finds that the zonular fiber-mass is most firmly adherent to the border of the orbiculus ciliaris, where the system of ridges of the inner glass membrane is actually most developed.

When one prepares the border layer of the vitreous in the manner to be described later, the posterior fibers of origin of the zonula go with it, and just as regularly, too, do the zonular fibers at the anterior border of the orbiculus tear off; the rest of the mass of fibers, so far as they fill out the ciliary valleys and circumlental space, remain in their natural relations.

But it is not alone due to the number of the fibrillae, but also to their direction, that the zonula is so firmly fixed at this point. The fibrillae all course meridionally, and all form about the same acute angles with the inner surface of the pars ciliaris; but these acute angles are open partly forward, partly backward. Thereby there arises a rich crossing of the zonular fibrillae in the space lying between the inner surface of the pars ciliaris retinae and the main mass of the zonula (see Fig. 20, Kr.). The fibers running backward are Czermak's orbiculo-ciliary fibers. One may also say that here a great part of the fibers from behind end, while numerous new fibers also take their origin here. Yet the expression 'origin' and 'end' are more or less empirical for the zonula, so I would practically abandon them. At this place at least there is so little difference between the so-called origins and insertions, that perhaps one best versed in the anatomy of the eye would not be in a position to say which was the anterior and which was the posterior part if a field from this region were put under a high magnification and the observer was not allowed to shift the field. I would not prevent anyone from speaking of this part of the zonula as the ending. This is a matter

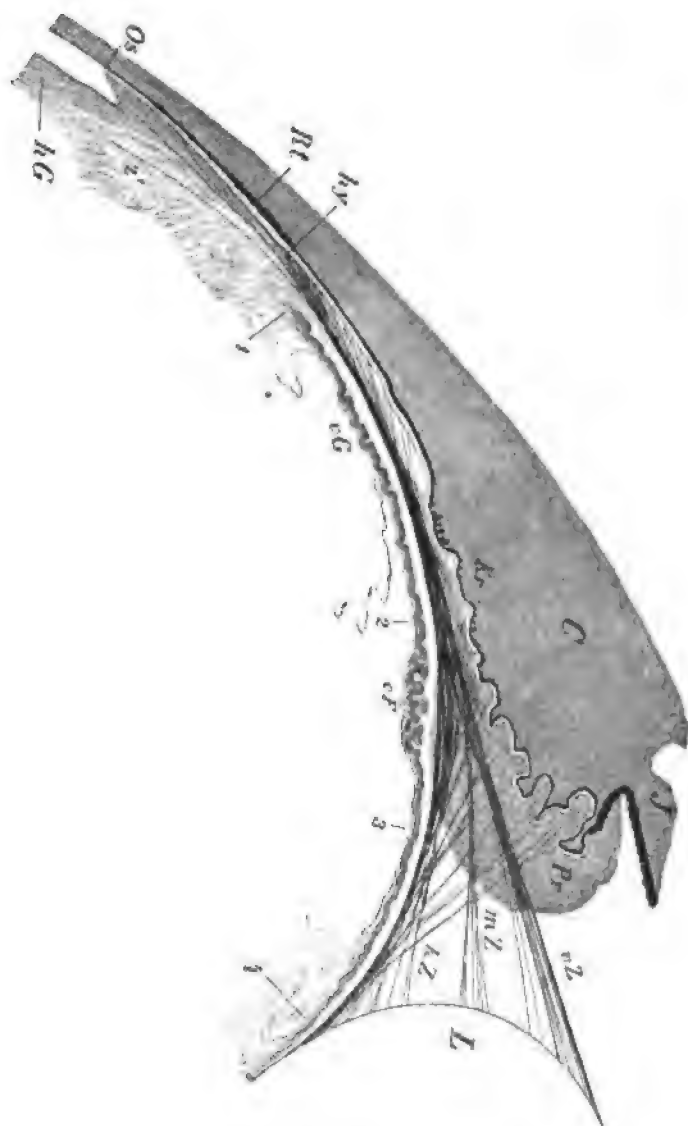


FIG. 20

of opinion and taste; however, I think that the histological picture, as well as the mechanical relations, are more correctly presented, if I say that here the zonula is fastened to the pars ciliaris by straight and backward-coursing fibrillae. This fixation gives the anterior margin of the orbiculus ciliaris a certain importance in the mechanism of accommodation, and for the pull of the zonula in general.

An exact width cannot be given for this zone. If one consider only the thickly-placed, backward-coursing fibrillae, this zone measures about 0.6 mm., and this nearly coincides with the zone of the small meridional folds. In addition to this, there are a smaller number of backward-coursing fibrillae still further back in the orbiculus and farther forward in ciliary valleys.

Posterior to this zone, that is, somewhat in the middle of the orbiculus ciliaris, the number of the straight coursing fibrillae is somewhat less, and the more posterior the fibrillae, the more obliquely they are placed, and the longer they are. A second maximum of frequency is found in the posterior part of the orbiculus where the ciliary zone of the hyaloidea lies. This place (Figs. 11 and 20; hy.) is characterized in still another way; the higher cylindrical cells of the inner layer of the pars ciliaris, and the large meshes of the reticulum of the outer glass membrane reach up to this point on the one side, and to the posterior border layer of the vitreous on the other side. Czermak and Topolanski make this the posterior margin of the zonula. As a whole, this is entirely correct, except that one must not say zonula, but the main mass of the zonula. For besides these fibrillae, a few take their origin from the ciliary zone of the hyaloidea and the vitreous body. The latter of these will be considered more at length farther on, and, too, the former, since here indeed the ciliary zone of the hyaloidea and the vitreous body are united with each other so intimately, that it appears more to my purpose to describe them after the finer anatomical relations of the vitreous body have been taken up. The posterior margin of the zonula reproduces the dentate form of the ora serrata retinae, as emphasized by Topolanski, and indeed in a yet more outspoken manner (Fig. 9). Where there is a large tooth in the retina, the posterior

valleys, the fibrillae of union become longer and more sparse, and finally go over into delicate fibrillae which arise from the anterior parts of the pars ciliaris, cross over the others and run to the posterior zonular bundles, forming thereby the characteristic cross-work of the posterior zonular bundles. We have now reached the anterior margin of the territory of the union with the pars ciliaris retinae, or, as one usually expresses it, the territory of origin of the zonula. This margin coincides with the inner crest of the ciliary body, i. e., the line of the ciliary body which projects farthest inward from the inner surface of the sclera. Yet the ridges of the ciliary processes form an exception; no zonular fibrillae are given off from them.

Finally, the presence of the inter- and intraciliary fibrillae must be spoken of. These are the zonular fibrillae which do not go over into the main mass of fibers, but unite various parts of the corona ciliaris with one another, i. e., the bottoms of valleys and processes, or one process with another. The latter appearance was reported by Claeys (17) too. A few other authors have spoken of circular fibrillae in the corona ciliaris. Yet they either expressly state that these fibrillae afterwards turn about in the meridional direction, or the discussion is so short that one cannot decide whether they belong to the category described by Czermak or not.

IV.—THE VITREOUS AND ITS RELATION TO THE ZONULA.

A. The Structure of the Anterior Part of the Vitreous.

That which was said in the chapter on the pars ciliaris concerning the relations of the zonula to its environment has been known for a long time and properly valued, and only details of lesser importance can be spoken of as not thoroughly established, or as yet within the realm of discussion. It is otherwise concerning the relations of the zonula to the vitreous body. Here, not only are the opinions very much divided, but a whole series of authors deny these relations altogether. The conception of the zonula as a modified part of the retina, at least of its sup-

porting fiber system, would have been scarcely thinkable if the knowledge of its unions with the vitreous body had not been forgotten. For one finds positive data concerning these things in some of the older authors, namely, Ulrich and Berger. This would be enough to justify the accurate consideration of the affair; however, in addition to this, it is true that our knowledge concerning the finer structure of the vitreous has been very paltry up to this time. I think that I am now in a position to add something to this knowledge.

The following presentation follows in the main that of Garnier and Retzius. We have especially to thank the latter for an extended presentation of the histological relations, and for drawings of a nicety heretofore unattained.

Like this author, I have made my studies in eyes hardened in Mueller's fluid. Since it was only my intention to show the unions between the zonula and the vitreous, I have used the material already at hand in hardened eyes with normal anterior segments, and have not studied the influence of various hardening methods upon the microscopical picture of the vitreous. And in doing so I am just so much the more justified in that the weighty voice of Retzius in any case has already spoken for the hardening in Mueller's fluid.

One can see the most of the details described below in good meridional sections; it is only necessary that an especially strong stain be used. When one stains weakly, the fine fibrillae do not come out satisfactorily. Mallory's phosphomolybdic acid hematoxylin has been of the most service to me in this respect. After a sufficiently long time (few hours to a day) this coloring material causes a stain of such intensity of all the tissue elements, that even the finest fibrillae are easily seen; for thick tissue, such as the cornea and sclera, this stain is of course not useful, but structures that are made up of single isolated fibers, such as the zonula and vitreous, show a very instructive picture. In order to decolorize the celloidin, which stains as heavily as the tissue itself, I put the section into two per cent. acid alcohol for a few minutes until the celloidin becomes lighter red, and then into seventy per cent. alcohol, which takes the rest of the stain out of the celloidin; clear in carbol-xylol and

mount in balsam. These preparations keep very well.* A marked and distinct stain of the fibrillae is sometimes also observed with haemalaun. I think that in general, any method which stains the tissues strongly and does not stain the celloidin can be used to advantage.

Equatorial, or transverse sections, as they should more properly be called, are necessary to complete the picture. I say these should more properly be called transverse sections, because a section which is at right angles to the inner surface of the ciliary body, and the meridional plane cannot at the same time be parallel to the equator of the bulb.

A large number of details can only be shown by surface preparations of the border layer of the vitreous. Harden an eye well in Mueller's fluid—my preparations come from eyes which had been in Mueller's fluid for several years—and bisect it in the equator. The vitreous appears more opaque and more uniform at the border, more in shreds in the center.

One very carefully teases out the vitreous under water, and begins in the middle among the looser shreds, and so proceeds gradually toward the surface. Care must be taken not to tear away the ora serrata, or to touch the inner surface of the ciliary body of the posterior surface of the lens with the points of the forceps. The border layer could be injured in this way. In this manner by grasping each shred at its free, floating, inner end, one is able to remove all the loose vitreous tissue and leave only the thicker border layer. In the region of the ciliary body the border layer is so thin that the ciliary processes can be seen through it.

The retina is now separated from the ora serrata by blunt dissection. After one has done this throughout the entire circumference, the end of the retina is grasped, together with the vitreous tissue which clings to it, and the border layer of the vitreous is removed by gentle traction toward the posterior pole of the lens. More resistance is often met at the posterior surface of the lens, and the preparation then shows a hole at this place. Usually, one is able to bring the entire border layer of the vitreous away as a delicate intact membrane showing the characteristic relief of the

*The preparations are now eight years old (December, 1907) and have kept their stain perfectly. Prof. Salzmann.

anterior surface of the vitreous body. The membrane is then stained with Mallory's hematoxylin, cut radially and mounted in Canada balsam.

In addition to the border layer of the vitreous such a preparation contains the fore-end of the retina, the ciliary zone of the hyaloidea, the posterior zonular fibers, and naturally, all the other zonular fibers which unite with the vitreous and all prolongations of it, at least stumps of them.

The following description makes no attempt to treat the anatomy of the vitreous body in an exhaustive manner. On the contrary, I only wish to go into those parts which border the zonula, that is, the peripheral parts of the vitreous in front of and at the ora serrata. For instance, I take no notice of the central canal, of which, of course, one can see nothing in this method of preparation.

In the vitreous as a whole, two kinds of substances can be distinguished: A firm, uniformly stratified cortex or border layer, and a delicate body of looser texture which appears shredded in the hardened state.

Border layer and body are not to be sharply separated from one another. They go over into each other somewhat as does the rind of a fruit into the softer parts. Both consist of essentially the same elements, immeasurably fine fibers without cells, blood vessels or nerves. In the finer details, however, there are certain differences. I begin with a description of the body, since its histological relations are simpler and easier to recognize.

The fibers are relatively large in comparison to the border layer, and stain more deeply. They are irregularly wavy, and cross each other in all possible directions, forming in this way a plexus of three dimensions. I think that a bolt of a very loose meshed cotton batting is the best picture of the fiber plexus of the body of the vitreous. According to Retzius, finest granules are present in the fibers; I have not always found them and would therefore rather consider them precipitates. In addition there are some larger angular clumps which are possibly to be looked upon as cell rests.

To begin with, I advise the study of the vitreous body in teased or compressed preparations. The fibers them-

selves with their crossings, the cell fragments, etc., are easily and quickly made visible in this way. However, in this way, the picture is projected into a surface to a certain extent, and fibers are pressed together into a layer and distorted, in part owing to the pressure of the glass cover-slip, and in part to the manipulation necessary to the mounting of the specimen. Only cut sections show in what manner, tangled and irregular, the fibers are disposed in space. The sections must not be too thin because of the delicate structure of the tissue.

The border layer has another appearance: on surface view it shows a tangle of extremely fine fibrillae. These fibers are so fine and delicate that even after the strongest

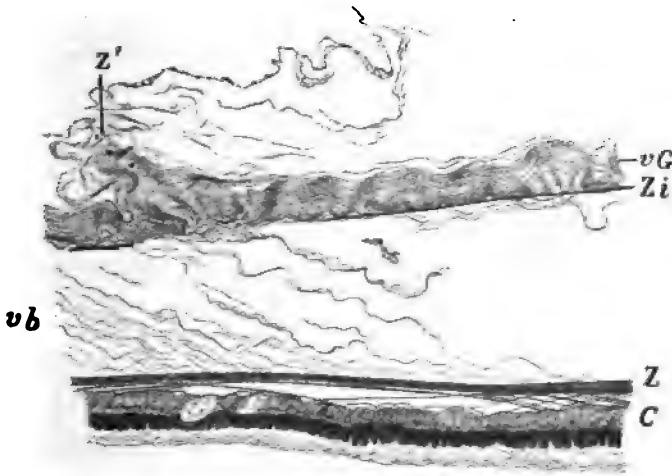


FIG. 13

staining with phosphomolybdic acid hematoxylin they only appear pale bluish. The tangle of the fibers can scarcely be followed even with the strongest magnification, so that one is often in doubt whether he has a homogeneous membrane before him or not. The fibrillation can be seen better with the middle power magnification (100-150) than with the homogeneous immersion.

When, now, one studies a cross-section through the border layer (see Fig. 13) a beautiful, low, wavy fibrillation parallel to the surface is seen. It does not make any difference in what direction the section is cut, meridional and

equatorial sections give the same picture. This cannot be due solely to the fibrillation, but must be due to an arrangement in lamellae similar to that in the cornea where the microscopical picture remains unchanged, no matter in what direction the section is cut, as long as it remains at right angles to the surface.

From the combination of these two pictures, that is, the surface picture and the appearances upon section, the border layer has the following structure: it consists of a great number of thin lamellae, which probably unite with each other a great many times, yet, only neighboring lamellae do so. Each lamella in turn consists of an extremely fine fiber net disposed in a plane, having therefore two dimensions. The angular little clumps, which were mentioned above as cell rests, appear to be entirely absent in the border layer.

The border layer gradually goes over into the body of the vitreous by dissolving itself into wavy trains of fibers given off from the inner surface (Fig. 11). It is an unmistakable flowing-inward of the fibers. The wavy lines that are developed in this way belong to the most beautiful constructions which modern decorative art can imagine. This is seen best on meridional sections through the region of the ora serrata, as this is the point of departure for the vitreous structure in general. This radiation of the border layer into the body of the vitreous corresponds in its arrangement to the vitreous membranes described by Straub (20).

We must perhaps be more careful in interpreting the microscopical picture of the vitreous than of other tissues. Its semi-fluid consistency in life, and the small amount of solid substance which it leaves on the filter, make it easy to understand that there are skeptics who contend the histological structure of the vitreous as more or less of an artificial product. Of course we must always keep in mind that we have a tissue changed by various reagents in our preparations. Yet such a skepticism only too easily overshoots the mark, and holds things for artefacts which are really built into the structure of the tissue. I would by no means make the general statement that every fiber seen in permanent preparations is present in life in the same form,

or, even present at all. However, pathological changes, such as suppurative infiltrations, show that a similar structure to that which one finds in a hardened eye must have been present in life. This statement principally holds true for the following details of the border layer which are more anatomical than histological in nature.

A zone about 1.5 mm. broad lying immediately in front of the end of the retina, forms, as already reported, the zone from which all of the vitreous fibers are given off (Fig. 11, Os-hy). This zone corresponds exactly to the ciliary

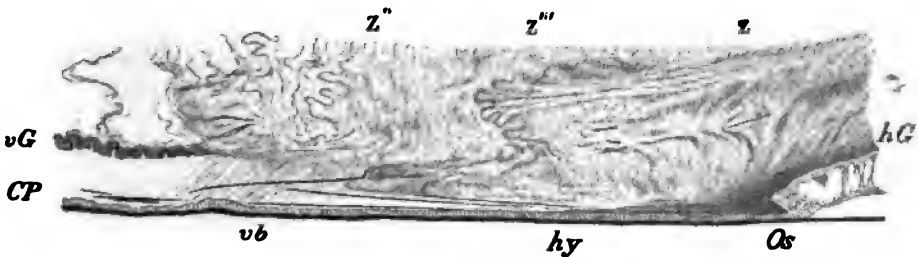


FIG. 11.—The vitreous in front of the ora serrata retinae with the border layers and the origin of the zonula. Meridional section 20 microns thick. Magnified 30 times.

Os—Ora serrata retinae.

CP—Pars ciliaris retinae.

hy—Anterior border of the ciliary zone of the hyaloidea along with the anterior border of the

hG—Posterior border layer.

vb—Union between the anterior border layer and the pars ciliaris retinae in the posterior part of the orbicular space.

vG—Anterior border layer.

z—Longitudinal section of the fine zonula of fibers which comes out of the vitreous body behind the ora serrata.

z²—Larger zonular fibers with a hook-like curve at the end arising from the vitreous body.

z³—Cross section of the zonular fiber in the vitreous body. The size of the zonular fiber is exaggerated in order to make it more plain.

zone of the hyaloidea. At the fore-end of the retina proper, the vitreous fibrillation turns backward, and its peripheral layers form the posterior border layer (Fig. 11, hG). This layer has no further interest for us. But also a thicker border layer is demonstrable at the zone from which the wavy fiber system goes out toward the body of the vitreous. This border layer is in im-

mediate connection with the posterior border layer, so that it can only be looked upon as a part of it. In an analogous way it may be spoken of as the ciliary zone of the posterior border layer. At the ora serrata it has its maximum thickness. Farther forward it becomes gradually thinner and thinner and runs into the inner glass membrane of the pars ciliaris in such a way that one can only recognize its cessation by the appearance of numerous zonular fibers (the posterior margin of the zonula (Fig. 11, hy.). It completely fills out the angle between the inner surface of the pars ciliaris retinae and the precipitous or even overhanging edge of the pars optica retinae. The appearance of this zone on meridional section is therefore that of a narrow triangle with its base at the border of the retina, and its outer side wholly applied to the ciliary zone of the hyaloidea.

Farther forward, the inner glass membrane of the pars ciliaris is no more in contact with the tissue of the vitreous proper. A narrow elongated space, the orbicular space of Garnier, the space that contains the zonula, separates it from the vitreous. The inner limit of this space is now again formed by denser vitreous tissues, that is, by a border layer. However, this part of the border layer is not a direct continuation of that of the ora serrata. It can easily be separated from that layer by anatomical preparation, and therefore is properly spoken of as the anterior border layer.

(To be concluded.)

THE COLOR SENSE.

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Years ago, while still a college student, my attention was turned to the color sense, and as I recall the conceptions that prevailed then, and which I, of course, received as authoritative, I am filled with amusement and wonder.

Period after period as I worked away at the problems, how complicated and wonderful they became, how full of unexpected and undreamed of developments; but after five years I found myself singularly alone in the midst of those who understood just about as much as I had done when I commenced to observe and think and read.

Realizing that it was not good to be too much isolated on any topic, I relaxed the severity of my hobby for ten years, only allowing myself the luxury of an occasional excursion into the fields, and now I am not spoken of any more as "that color crank." But what a field it is, and what wonderful things it holds for every one who cares to observe and has the joy of investigation.

Somehow, all the jargon of rods and cones and photochemical theories; of brain paths and fatigue stuffs; of anabolic and katabolic phases of contrast; and the association of ether waves and nerve impulses, has become toned down; and the enthusiasm of advocacy of the greatness of small discovery in matters not before spoken of by those who thought they knew the subject, has lost some of the sharpness and rawness. When I presented some new thoughts before the International Congress of Psychology in Munich in 1896, I am sure I was a very ardent young man, and perhaps those thoughts, if differently presented, might have made a greater impression.

At any rate, I find that the partial conceptions which often amounted to misconceptions that were current when I began to study, are repeated but slightly modified to-day. There has been progress here and there in a few

lines, but I cannot find much broader views on the fundamental problems.

The biology and psychology of the color sense seem to be but lightly touched upon, and the medical text-books appear to show but little progress. Possibly this is because the field has little to do with mechanical operations on the mechanism, and less with bacteriology, and every one knows that these are the real sources of joy to the average medical man.

How few minutes the busy man has for things not instantly practical, and how little consideration do the pure sciences get at our hands, in spite of our knowledge that all our practical applications depend on the work of laborers in the fields of pure science.

I have seen the practical side of the color sense, and because of its immense commercial importance, I venture at this time to present some of the results of the past fifteen years of practical and theoretical significance. But of more importance to the medical man than even these matters, is the light thrown by the study of diseases of the color sense on all forms of mental and nervous conditions. Unsuspectingly I wandered and groped through the mazes of rival theories hoping to get light on the problems of color perception. I dipped into what is so crudely called color blindness, and after some time I found a great section of neurology flooded with a new light, and I can say with confidence that the study of this so-called color blindness offers one of the greatest avenues of approach to the problems in inheritance, and the acquiring of nervous defects, and is one of the greatest fields for the student of pathogenesis.

The world was full of color of the most marvelous variety and richness before the beginning of organic life, and in the very earliest types of organized individuals we find reaction to color. Long before sense organs are discoverable, we find the radiant forces causing responsive activity. Early in the organic series we find the specialization in reaction to the rays of different sorts showing itself, and at every step forward in the development of form and function, we find color taking on a more important part in the life of the individual.

Very early, color becomes associated with the safety of the individual. Usually it is the greatest guide in food getting, and as soon as perceptive organs show themselves, color plays a vast role in sexual selection.

Even before the color perceiving organs, there appears a tendency to pigment production in such a way that we are forced to realize that there is a chemical reaction preceding the organization of a responding perceiving structure. From the moment color perception is established, the problem becomes of vast complexity. Long before form is clearly perceived, color is the optical signal caught by the eye. The flower calls the insect with a colored flag. The chameleon protects himself by automatic color harmony, established with his surroundings.

The peacock fascinates his mate by an elaborate color display that makes human efforts at coloring seem clownish. Throughout the whole animal series we see the colors wrapped up with the fundamental emotions; now with fear, now with rage, but always with the sexual sense.

The plants purchase the service of the animals in perpetuating their kind by supplying a little food, but they advertise to the seeing animals by color, and to the blind or night-going, by odor.

Far afield as all this may appear, it is quite impossible to grasp the nature of the relation of the color sense to the emotions and life of the human animal, without a realization of the beginning of the color sense and its significance. For try as men may to escape from the inevitable conclusions of science, we are still direct children of the past of the animal family, and our high ideals and fine arts have their beginning in the primitive reactions of the earliest forms, and the themes of color perception are made clearer by the study of both ends of the series, provided we realize the great trend of development of the color sense in the organic series.

To-day we are so complexly and elaborately made, and our color sense is so interwoven with the whole structure of our mental life, that it is only with great difficulty that we are able to elaborate a system which will isolate the color factors. No two of us react to color with the same

force or in the same manner, and each one varies very markedly in this reaction, under different conditions. You can study these effects by following one or more of the methods I used; for instance,—hang over your window, a sheet of colored tissue paper for a week, and note its effect upon yourself under different conditions. Allow your patients or your friends to be so seated that they cannot help getting a full force dose of the tinted light. A little study of the effects, and you will be able to produce some astonishing effects on robust persons. I have produced at will a great variety of conditions simply by sheets of colored tissue paper over a window. I have had strong men develop all sorts of restlessness, up to the point of actual horrors, and have often been able to allay these conditions when aroused by selecting other colors, though in extreme cases the nervous effect lasted for hours, and the memory was so sharply impressed that the subject refused absolutely to endure any more experiments.

The effect on nervous persons is often greatly increased, and experiments should be carried on with care, if at all, when there is serious nerve lesion. Few hearty, strong persons can long continue a searching study of the subjective effects on themselves. Although I had a robust color sense by inheritance and development, I found that after a year I had to be careful to arrange for periods of color repose and when I studied others, I so far as possible rested my own perceiving apparatus. To-day my color sense is acute but is much easier to exhaust than at first. Should we become color experts, we would be able to read character by a trifling color test, as we now do by handwriting. This I have done to a degree. We would find the emotional attitude of the individual in many cases so displayed, that reaction to certain situations could be predicted with assurance.

So completely is color sense woven into every part of our lives, that any change of the ordinary color of an object, will entirely alter the personal attitude. So absolute is the color domination of our lives, that the effect of a sudden change of the colors of all objects about us produces the most amazing subjective results. I do not know of any better way of conveying the idea of the vast

significance of color, than by provoking the imagination to change all colors either to the next color below or above in the spectrum.

I can do little more at this time than point out the general significance of color, and the deeply rooted associations that have become instinctive. Strongest of all colors are the yellows—the indescribable effect of the full yellow glow of sunset, and of gold, have a hold on the sensorium of the race that is universal, and with that color, go emotions of a certain class.

The opposite color, blue, has a vastly different effect, yet when combined with yellow, we have all the series of adoration—worship. Taken separately, each has an almost universal emotional value; taken in combination, and we have a new value, the effect of which depends upon the susceptibility of the individual.

Turn to the third great color,—red, and think of the almost universal emotional significance, flame, blood and lust. Couple the gold and the red, and how the two change each other again; the effect depends on the personality of the individual, but the type of the effect is general. And now the fourth great color, and the emotion of peace tones the series into an endurable whole. No system of scientists or artists that ignores this absolute subjectivity of color, and the fact that there are four subjective colors, need command our attention, no matter how clever it is.

There is a curious thought regarding the origin of the two groups of complementary colors, and perhaps we could best present it here. The physicists like to speak reverently of the Young-Helmholtz theory, with the red, green and blue; the chemists prefer the photo-chemical theory, where the yellow and blue, and red and green, are opposed, and the black and white series is a thing apart. Students of color who know the subjective effect of color and are masters in producing color effects, are not content to ignore the most powerful color—**yellow**.

Now, I believe that in time it will be demonstrated that the yellow-blue series is effective by reason of a photo-chemical change which is closely associated with the pigment producing photo-chemical changes, and is repre-

sented throughout the animal series by sense organs having pigment.

The red-green series is, on the other hand, more closely related to heat sense, and has developed in close psychic intimacy with the temperature sense, and is, therefore, more strictly physical in mode. I have not been able to carry out certain tests that I had planned, but I am convinced that from all thoughts, physical, chemical, physiological and psychological, it will be found to be a true conception.

The bearing of this on medicine? Can there be any difficulty in realizing the vast importance of being able to value and use such a powerful factor? It is of course true that the retina fatigues for any one color and becomes less receptive, and so the effect is lessened, but it is also true that that very fatigue is having an action on the nervous system, and that the reaction and after color, will continue to have effect. Return to the tissue paper experiments, and after finding a really horrible tint, sit with it alone for an hour if you can, and you will never again minimize the effect of color on a sound nervous system. It is not mere poetic impulse that bids the overwrought emotional writer of verses laud the green woods and fields; there is nerve health in the green that is not in the red of bricks, or in any other color. I shall, in a subsequent paper, take up other phases of color sense and its pathology.

It is not thought necessary for a man to explain why he does not neglect color considerations when he chooses his clothing or the decorations of his house, and few are indifferent to the color harmonies and discords that are shown in the garments of the other sex. There are very few persons who have not experienced strong feelings about some colored object. Many of us remember some hideous display of simple color, or of some contrast, such as wall-paper, carpet, dress, painting, or frame house.

The curious thing is that few medical men pay any attention to the color problems of their cases, though it is no common thing to get testimony regarding the effect various colored objects in the sick room had on persons in a delirium from any of the fevers. In neurotic children

and neuropathic adults, the effects are often as marked as in fevers, and I have known cases so affected by color that the resulting irritation of the nervous system was vastly more than is often taken as sufficient ground for surgical interference, such as circumcision.

The nature of the perceiving organs is such that a single color (spectrum) in ordinary conditions will not cause serious disturbances, but should conditions, subjective or objective, have been of such a sort and series, it is possible for a single primal color to produce intense effects. The flood of yellow light above the altar in the Cathedral of Milan, has a positive emotional effect hardly equalled in any other place. The royal purples, made up of combinations of red and blue (if we refuse to class purple as a separate color) have a natural effect on the average person even without other settings, and the predominance of the blue or red, forms an index of brain activity of the individual. From the fierce visceral red of the Venice School to the soft, deep violets of the truly religious painters, we have wonderful series.

I use the illustrations of the Masters of color in Italy because the world acknowledges that they have obtained results already, and there might be some highly virtuous professional skepticism if I were to draw from my own experiments, though they agreed in every point. I am tempted to go further in the line of the work of these Masters who knew so much about the color sense, for I have spent many a laborious, but delightful hour, with their works; but other phases yet to be touched upon are important.

We have a power in pure color at all times; we have a peculiar added power in pure color due to bodily and mental conditions, and with these, a very variable factor, that is most difficult to grasp, but often of greatest importance, namely, the order or series of mental impressions that precedes the color impression.

Given a normal man in average health under definite conditions, time of day, digestion and fatigue, and a color will have a fairly fixed value to him; if it does not have a fixed value, and the conditions are not radically changed, the man is not normal in his color sense. Let such a set of condi-

tions be established as will ensure for a normal man, a normal color reaction for a number of days, and then experiment with other conditions; see what drugs such as tea, coffee, tobacco, quinine, opium, alcohol, will do, and surprises that will be in store for the unsuspecting person are more than remarkable. I am very sure there will be a larger grasp of the psychic effect of drug habits than before.

Having settled more or less roughly the status of the normal man and pure color under conditions of hunger, of fatigue, of emotional thinking, of drugs, of pain, and of sensations by other senses, turn then to the presentation of simultaneous contrast and harmonies, and while it is easier to get striking physiological and psychic effects, the results will not be so profound as those of pure color, if attained in perfection.

The themes of relative size and intensity of colors used are too complicated for our present line of thought, but they afford most wonderful vistas for endless study. Now add the sequence of different colors and we have completed the series of the normal. The effect of the sequence of colors is far too intricate for our present consideration.

The departures from the normal, form a vastly varied group of studies, not as some of Holmgren's stupid followers would indicate, nor yet as Edridge Green fancifully supposes, but a great mass of curious possibilities of variations from the normal.

The normal man perceives certain color effects which are by no means limited to seven or three, in fact, the mass of his color sense perceptions are all apart from the spectrum.

The sciences have all been dominated at one time or another by the imperfections of some instrument, and color sciences have suffered much by reason of the prism bound physicists. The colors of actual life have little relation to those of the prism so far as subjective effect goes. The grays, browns, purples, pinks, greens and blues, are in no way like the rainbow effects, but not having any instrument that will represent the subjective values, we must take and make the best of what we have.

The spectrum to the normal average man presents a series of qualitative color changes associated with fixed lines over definite positions. The total length, and the actual and relative brightness of parts vary within limits in the normal, and beyond these limits in others. The spectrum may be longer or shorter, and this may be a matter of variation under different conditions.

To-day it may be several percent. longer than yesterday, and to-morrow it may be short again. The temporary fatigue in the normal eye will cause a considerable shortening and lengthening of the extreme parts of a long dim spectrum. The nearest approach I have ever seen to a "red blind," had a marked shortening of the red end (this man had been published as a typical red-green blind, though he gave clear signs of vestiges of red perception.

His perception at the other end appeared nearly normal, but the area seen normally as green was to him simply a pale continuation of blue and yellow, though I have never been able to get a sure grasp of how these two came together. The best I could get was that it appeared gray, corresponding to a sample of pure gray produced by a projecting apparatus.

I have never had the fortune to know of any one who perceived an unusual number of colors in the spectrum. Though some claimed at first to do so, it was clear that what they really saw was a difference between different areas of the same band, but not a distinct color, which was nothing more than fine color power, and not a new type of color perception, based on the spectrum.

The abnormal color perception begins in the almost imperceptible changes of psychic attitude toward color. An unusual sensitiveness to color and emotional reactions of unusual intensity over colors of moderate force, are quite as truly a sign of an onset of color sense change, as is apathy of an equal degree, and is a sort of irritable weakness that speaks of pathogenic changes.

It is not surprising that we find a large per cent. of color defectives among the descendants of austere ancestors who were keenly irritated by color. Another, and in some ways different phase, is the easily fatigued color

sense which is found in children too much fondled. A color apathy with little ability to retain the attention on colors long enough to perform a test properly, is associated with a blase type of sexual excess that is associated with considerable vitality, but low mental development. A true color hysteria exists where pale colors are confused, though the eye is capable of seeing the component colors, and this occurs in nervous males not strictly neurotic in type.

The marked cases of color defect are inherited, while any of the forms may be acquired. There are predisposing tendencies. The giving way of the green is seldom complete until the family inheritance is well established. The faint glimpses that fade and return serve only to confuse the person until he never really knows what he does see.

Gradually as the green perception goes altogether, the eye assumes a peculiar appearance, and color naming becomes easier, and the errors are readily detected. The red sense goes with the green, but less rapidly, and seems to be able to suggest green oftener than does some neutral color, as though the fatigue and contrast effect (complementary) remained. After the green sense has gone, that color is inert, but red may be called green while bright red only will be called red.

I have been able in most cases where color defect existed, to find that the ancestors were emotional—usually religious—to excess; and I have been fortunate enough to study several cases where emotional excess in the individual had a most distinct effect in the color sense, and there can be no doubt that the emotions react on the sense organs.

36th and Chestnut Sts.

A CASE OF QUININE AMAUROSIS.*

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The effects of poisonous doses of quinine upon the visual functions were noted as early as 1829 by Berandi¹ in Milan. The first ophthalmoscopic reports were made by Von Graefe² in 1857, but the first carefully studied cases were reported by Roasa³ and Vorhees⁴ in 1879. From that time until the last decade, according to DeSchweinitz,⁵ only about one hundred cases had been reported. Since then, however, stimulated especially by the investigations of Barabaschew,⁶ De Bono,⁷ DeSchweinitz,⁸ Holden,⁹ Birch-Hirschfield¹⁰ and Druault,¹¹ many other cases have been added to this number.

In some of the cases reported, the amount of quinine employed was comparatively small,—as little as twelve grains, resulting in a temporary amblyopia, with no ophthalmoscopic findings.

In other cases large doses were employed,—as much as an ounce in twenty-four hours, resulting in more or less permanent amaurosis, with the well known ophthalmoscopic signs of quinine poisoning—the pallid disk and contracted vessels, associated with dilated pupils and immobile irides, and perhaps nystagmus and strabismus; and later by permanently contracted fields, and defective light and color sense.

The case to which I ask your attention was referred to me in 1902. She was then a young woman twenty-two years of age, who, upon questioning, gave the following history:—

Being in good general health, but with a definite purpose in view, at eight o'clock one evening, about one and a half years before the consultation, she took by mouth eighty grains of quinine sulphate in the form of forty, two grain pills.

*Read before the Section on Ophthalmology, College of Physicians, Philadelphia, February 20, 1908.

At ten p. m. the patient was found in a stupor, and the family physician was called. At midnight nausea and vomiting set in. Upon waking or regaining consciousness in the morning, she found that she was blind, being unable to detect hand movements or even, she says, to distinguish light.

This condition continued for three days, during which time the only local symptom was tenderness of the globes upon pressure.

She then began to have light perception, first noticeable by flashes and other indefinite sensations of light. This was soon followed by the recognition of large objects.

From this time vision gradually improved for several months until it seemed to reach a stationary stage.

The patient then came, a year and a half after the poisoning, complaining of indifferent vision at all times, but was especially embarrassed at dusk, when persons, street-lamps, and other objects were collided with; uneven pavements caused stumbling; walking from a lighted into a shaded room was accompanied by great reduction in visual acuity. Also going from a darkened into a lighted room was followed by temporary blurring of vision.

Ocular examination at that time showed:—

Pupils equal and rather larger than normal; irides active; stationary under cover. Convergence good.

Vision O. D. 6/9 slowly

“ O. S. 6/9 slowly

Ophthalmoscopically—Media clear; disk oval; well marked scleral ring. Disk uniformly whitish in color. Lamina cribrosa plainly seen in a shallow excavation. Retinal vessels, both arteries and veins, small in calibre. No chorioidal or retinal changes.

Refraction under a mydriatic gave as a result +2.25 S. for each eye, which less +.50 S. was prescribed. This correction gave 6/9+ in each eye.

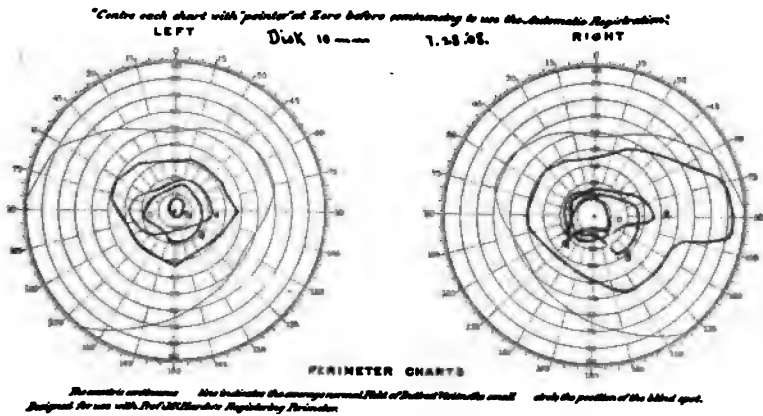
In March, 1907, four years later, patient returned for re-examination. She reported that the general vision seemed somewhat improved, and that in day-light she was quite unconscious of any defect; but with the first

approach of dusk, confidence in her judgment of distance and the position of objects and people in the street was lost.

Inspection gave the same result as upon previous examination.

Vision had improved from 6/9+ to 6/6: under ordinary illumination. In a room with no artificial illumination, where observer's vision was 6/5, patient's vision was still 6/9.

Light sense taken at 5 meters with De Wecker's pho-



tometric charts, with the ordinary illumination used for test cards, gave as a result with correction,

O. D. 3/10

O. S. 3/10 - slowly.

Without correction,

O. D. L. 1/10 —

O. S. L. 1/10 —

Ophthalmoscopically, the disks were uniformly white grey in color; lamina cribrosa plainly seen; both arteries and veins, smaller than normal, though probably not so small in calibre, as when seen four years ago. The disks have fine capillaries. Along larger vessels are the fine, white lines of an old perivascularitis.

Fields for form and color are uniformly contracted.

Unfortunately ophthalmic observation of this case is lacking for the first year and a half. Examination in the

acute stage would no doubt have shown the well known phenomena of quinine poisoning,—contraction of all the retinal vessels, the pallid disk, dilated pupils, absence of light reflex, etc. Then later, as the restoration of central vision began, the loss of color and light sense, and the contracted fields would have been discovered. As seen in this case now after five years, the fields are still contracted both as to form and color, and while the vision under good illumination is now all but normal, the defective light sense still furnishes a most annoying sequel of the patient's unfortunate experience.

The late ophthalmoscopic findings, the permanently contracted vessels, the appearance of perivascularitis along the larger arteries, and the pale disk, constitute the usual picture of an advanced stage of quinine poisoning.

As is well known, most interesting studies of the pathogenesis of quinine amblyopia were made by De Schweinitz⁸ in 1890-1, and also that in 1896,¹² by experimentation upon dogs.

Still later, Ward Holden¹³ in 1898, demonstrated his theory from the pathological finding in a similar series of experiments, which ascribed the primary amaurosis to the ischemia following the vessel spasm. Soon, from the lack of food supply began a degeneration in those elements most susceptible to a diminished blood supply,—the ganglion cell layer and the nerve fiber layer of the retina. Consequently the permanently contracted fields, and the defective vision varied in degree according to the spasmodic influence of the poison upon the vascular system.

Druault,¹⁰ however, says—"Having undertaken a series of experiments upon dogs, I have come to the conclusion that the role of ischemia has been exaggerated." His researches in 1900 indicated that degeneration of the ganglion cells could not be attributed to circulatory disturbances alone, but was the result of the direct action of the poison itself upon the cells.

Birch-Hirschfeld¹¹ also believes that the primary lesion is in the ganglion cells of the retina, but that this primary degeneration is due to the toxic action of quinine upon the cells, and not to ischemia. He thinks the blood vessel

spasm has an accessory action in the ganglion cell degeneration, and is particularly active in producing the secondary changes in the nerve fibers in the more chronic cases.

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RECURRENT HEMORRHAGES INTO THE VITREOUS HUMOR OCCURRING IN ADOLESCENCE.*

FREDERICK KRAUSS, M. D.

PHILADELPHIA.

Recurrent hemorrhages into the vitreous humor, occurring in adolescence, is an interesting disease both on account of extreme rarity and the mystery surrounding its occurrence.

It generally occurs in young men between seventeen and twenty-eight years of age, and usually in young men who are somewhat depressed in general health, and who suffer from constipation.

The hemorrhages occur at intervals of several weeks, months, or years, and result in temporary blindness; one eye may be affected or both eyes alternately.

The etiology is unknown, though it is generally supposed to be connected with auto-intoxication due to intestinal absorption, which causes sudden changes in blood pressure. The sudden increase or decrease in blood pressure causes rupture of the chorioidal veins which pour their blood into the vitreous humor. The prognosis is guarded, some eyes recovering full sight with more or less vitreous opacities, while others may be lost by glaucoma, retinal detachment, etc.

The case that I have the honor to report, is a twenty-six year old man who has had six hemorrhages at intervals, in the space of two and a half years, the hemorrhage in every case involving the right eye, the left continuing normal.

H. R.—a young man—now twenty-six years of age, a Roumanian Hebrew, is a sheet-iron worker by trade.

FAMILY HISTORY—Father died at 65 years of age of apoplexy, sick two days; suffered from bilateral optic atrophy. Mother living and well, three sisters and three

*Read before the Section on Ophthalmology, College of Physicians, Philadelphia, Feb. 20, 1908.

brothers living and well, one brother died recently at 18 years of phthisis pulmonalis. Ocular history negative.

PERSONAL HISTORY—Has always enjoyed excellent health, except that four years ago had an attack of gastritis; no history of epistaxis. Recently he has suffered from soreness in diaphragm when taking deep breath. No cough. Appetite poor. There is a marked tendency to constipation. Sexual history is negative. Patient is pale, smooth face, boyish in build. Syphilis and venereal disease denied.

The patient was first seen October 29th, 1905, with the history that five months ago he had a sudden attack of blindness in the right eye, which disappeared in three days without treatment. This attack was preceded by headache lasting several hours. On October 28, 1905, he had an intense headache in the morning, lasting two hours, after which there was a quivering in the right eye, followed by darkness, which has remained since. His vision was counting fingers in the right eye, and 5/5 partially in the left eye. Aside from sluggish adduction of the right eye, the ocular muscle movements were good.

The right eye showed opacities in the vitreous, most dense posteriorly and below, allowing no details of fundus to be seen. The left eyeground was normal except that the veins were full but not tortuous. The right pupil was fully dilated with euphthalmin. The vitreous humor was found to be filled with blood, allowing a red reflex only in the extreme upper and anterior section of the fundus. Oblique illumination showed the color of the blood to be bright red.

The vision improved very slowly for three weeks, after which the improvement became rapid, resulting in 5/9 vision one month from onset of hemorrhage. The media at this date were apparently clear. The disk was normal, the veins filled with dark blood but not tortuous. About one disk diameter above, and slightly to the temporal side, and close to the superior nasal branch of the retinal artery, was a round area of chorioiditis, from the lower edge of which, extending like a veil and floating free into the vitreous, was a thin, semi-transparent membrane, as though it might be detached retina; 1/2 D. diameter above this was a second and smaller area of chorioiditis, with

slightly pigmented edges and having a small piece of veil-like membrane extending from its lower edge. Slightly above this was a spot of pigmented chorioiditis. The rest of the eyeground was normal.

The patient then disappeared from my view until one year later, November 16, 1906, when he returned with the statement that he had noticed a thick smoke appearing before his right eye, beginning on the right side, from which it had extended over the whole sight. He could count fingers at 20 cm.

The ophthalmoscope showed fine vitreous opacities. Extending into the center of the vitreous is a thin balloon-like structure, apparently filled with blood and serum, and studded with minute white glistening spots. This structure floats freely in the vitreous, and is best seen with + sp. 13 D., and is held to the lower equator of the eye by a twisted strand. No view of the eyeground was possible.

November 22, 1906, the vision was $1/2/40$, and eight days later, when next seen, the vision had increased to $5/5$. On the disk there were several punctate hemorrhages. Extending out from the center of the disk is a thin semi-transparent film shaped like a water spout, the apex best seen with + 8 D.

The field of vision was slightly and uniformly contracted. Refraction with a mydriatic showed in each eye + sp. 0.37 D. + C 0.37 D \times 90.^o The vision in each case being normal.

In June of 1907 he was troubled by sensations of objects floating before the sight, caused by vitreous opacities and the veil-like structure attached to the areas of chorioiditis.

On September 7, 1907, he returned stating that thirty hours previously he was awakened by intense supraorbital headache, following which he again became blind. The blood was sufficiently absorbed on September 23 to show a minute hemorrhage on the disk in contact with the inferior temporal branch of the retinal artery. The spots of chorioiditis were larger and the film-like tissues more pronounced. The vision improved from counting fingers, to $5/9$ on October 28, 1907.

On November 17, 1907, another and greater hemorrhage occurred into the vitreous, the blood being apparently against the posterior surface of the lens. The appearance by oblique illumination being very striking, the blood causing the appearance of a bright red reflex.

The vision improved from hand movements to 5/5 by December 3, 1907, at which time there were present, numerous vitreous opacities which had settled in the lower third of the vitreous humor. They were reddish in color, and in shape like elongated blocks.

Graefe,¹ in the first volume of Graefe's Archiv, mentions this disease. He states—"I have treated patients who have nearly periodically suffered from intraocular hemorrhage, destroying sight completely, at intervals of several months. It is peculiar that the patients were nearly all young individuals, in the twentieth, thirtieth and rarely fortieth years of age. In a few cases a complication of apoplectic attacks indicated vascular disease. In many there had been previous nasal hemorrhages, which have ceased since the ocular hemorrhage. In two cases there seemed to be a relationship with hemorrhoidal bleeding, and in another the cessation of perspiration of the feet."

Eales² reports five cases occurring in young men, in four of whom the bowels were sluggish or constipated, laxatives being constantly needed. They were all more or less subject to epistaxis, and had a slow pulse with high arterial tension. One eye was lost by glaucoma.

Eales states that "In no case was there evidence of primary retinitis or any constitutional disease, such as syphilis, leucocythemia, anemia, etc., to account for the hemorrhages. I think, therefore, we are compelled to look on high arterial tension with dilated arterioles and capillaries, and consequent distended venous system (all increasing the tension in the capillaries) as the cause of the hemorrhages, both in the eyes and from the nose, in both of which places the hemorrhage probably occurred from the capillaries. The seat of the retinal hemorrhages in the granular layer and at the periphery are in accordance with this view."

Eales states further that, "In short, I consider the con-

stipation, however produced, as the starting point of all the other phenomena in these cases."

The occurrence of the hemorrhage more frequently in the left eye he considers more than an accident, and thinks that the left carotid artery coming direct from the aortic arch, and the greater length and more indirect course of the left innominate vein which joins the other almost at right angles may cause a slightly higher tension in the capillaries on this side, and so account for the greater frequency of hemorrhages on this side.....Probably females are saved from retinal hemorrhages by their menstruation."

Nieden³ states that among 34,489 cases seen consecutively in eight and one-half years, only six cases of idiopathic recurrent hemorrhages into the vitreous were observed. In three cases the second eye remained normal, while in the other three both eyes were affected alternately. Increased tension was never observed, but rather a softening of the globe. Myopia was never present. He also states that of nine eyes affected in these six individuals, five occurred in the right eye and four in the left eye, and the relationship to increased carotid pressure on the left side suggested by Eales has no apparent bearing on this disease.

The hemorrhages were absorbed in a few weeks, showing the sources of bleeding in the periphery and apparently unconnected with the retinal arteries and veins.

These cases occurred mostly in young men of good health but of lymphatic appearance, doing no heavy work, with no history of syphilis or tuberculosis. They did not suffer from constipation, but were generally sleepy, tired, lacking in appetite and energy. They occurred in spring and summer months.

Nieden believes that the cause is probably the slow development of sexual apparatus, in these cases unrelieved as in females by menstruation, and that the nature of the disease is the same as that of epistaxis. He believes from his observaion that the bleeding occurs from the choroidal vessels, and not from the retinal vessels, as suggested by Eales. In this he is corroborated by the anatomic examination of Brewster.

Schweigger³ states that he had observed this disease in young women as well as men.

Panas⁴ cites two cases occurring without any apparent cause in young robust men from the country, who lost both eyes, one after the other, in spite of medication. He deems the prognosis serious.

Koenig⁵ reports a case occurring in a young man twenty years of age, who had an enormous varicocele. The hemorrhage occurred alternately in both eyes, and was evidently due to rupture of the retinal vein. He thinks that the name of epistaxis intra-oculaire, suggested by Panas, is very appropriate.

Zieminski⁶ studied four cases, and saw a fifth case in Galezowski's clinic. He believes that the bleeding is from the chorioidal vessels, as was demonstrated in the latter case beyond doubt. He thinks that auto-intoxication from intestinal absorption causes the hemorrhage.

Kries⁷ reports a case of a single spontaneous hemorrhage into the vitreous of a young man twenty-seven years old, after malarial fever.

Hutchinson⁸ reports a case happening in a young man twenty-four years of age, in whom the hemorrhage occurred into the left eye, with suddenly increased tension and blindness. An iridectomy failed to relieve the condition, and one month later the eye was removed on account of intense pain and blindness. Pathological examination showed hemorrhages into various parts of the vitreous, between the vitreous and retina, into the ciliary processes, and into the retina near the disk. Two years later, hemorrhage occurred into the right eye without glaucoma or iritis. He was constipated and suffered from indigestion.

Hutchinson reports three other cases. In two of the above cases there was marked diminution of the blood pressure, which leads him to think that hemorrhages are due to "an obvious tendency to inequalities of the circulation, either too high or too low blood pressure."

Mayweg⁹ reports the case of a seventeen-year-old boy in apparent good health, in whom the left eye was lost by spontaneous hemorrhage into the vitreous, followed by retinal detachment. The advent of frequently recurring hemorrhage into the opposite eye which resisted treatment caused

Mayweg to resort to desperate measures, which he recommends as a last resort. He ligated the right common carotid artery, after which the vision gradually improved.

Nieden,⁹ as well as Panas,⁴ believes that by watching the sphygmographic tracings of the pulse we can, not only determine the cause of the difficulty, but also tell the prognosis very accurately.

In conclusion, it would appear that the continual absorption of poisonous toxines from the intestinal tract over a long period caused either increased or decreased blood pressure, which causes rupture of weakened chorioidal veins. Considering the fact that constipation affects more or less at least one-half of modern mankind, and that adolescence in young men is not particularly liable to this trouble, it is very hard to conceive why it should select in such rare instances to cause vitreous hemorrhages in young men. There must be in addition to such a change in arterial tension a weakness or local disease in the chorioidal or retinal vessels, which permits rupture when other conditions are favorable.

It is well known that the vascular formation occurring in the mucous membrane of the anterior portion of the nasal septum in some individuals is so constituted that any excitement such as hurrying, anger, or laughter, will cause severe epistaxis. These vessels are near the surface, probably have degenerated walls and will bleed upon touch.

This nasal condition is found mainly in adolescence. Is it taking too much for granted to suppose that such a local vascular degeneration could exist in the chorioidal capillaries? In such an instance anything that could cause marked alteration in blood pressure, such as is indicated by the severe headache preceding the vitreous hemorrhage in the above case, would cause a rupture of the weak vessel walls and a pouring out of the blood. If the lamina vitrea should prove resistant for a time, the blood could be forced between the vitreous and the retina into the ciliary processes, causing glaucoma and iritis. In other instances, a cyst-like appearance would be caused by the bulging of the lamina vitrea into the fluid vitreous which is present in these cases. This appearance was present at one time in the above case.

Finally the blood can pour directly into the vitreous, becoming absorbed, and after repeated hemorrhage, result in permanent vitreous opacities. Should the clot become organized, retinal detachment would occur, as in the case reported by Mayweg.

Treatment must be more or less empirical, and guarded by common sense. Generally speaking, it should consist of absolute rest, attention to the general health of the patient and the treatment of the local eye condition. Nieden is very partial to the internal use of biniodid of mercury combined with iodid of potassium. All sorts of hemostatics, such as ergot, gallic acid, etc., have been used, but it seems to me that such remedies only upset the stomach.

In the above case the remedies most efficient were fluid extract of pilocarpus m. xx to xxx three times daily, associated later with increasing doses of iodid of potassium. The most decided benefit resulted from the use of pilocarpus, since in several instances its withdrawal caused the patient to ask for it, and an immediate improvement of vision followed its use. This was not imaginary, as the resultant vision was normal.

As there was present a faint congestion of the deep scleral vessels of the eyeball, atropin was used, and apparently with excellent effect. The tension remained normal.

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ABSTRACTS FROM ENGLISH OPHTHALMIC
LITERATURE.

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Bilaterality and One Sidedness in Diseases of the Eye.

GRADLE, H. (*New York Medical Journal*, Nov. 23, 1907), reviews the more important diseases of the eye which are typically one sided or bilateral. He names acute catarrhal conjunctivitis, due to the pneumococcus, Weeks' bacillus, or the Morax diplobacillus, as bilateral unless in the mildest cases, gonorrhoeal conjunctivitis of the adult as monolateral as a rule if properly cared for, and not always bilateral even when no shield is used, chronic conjunctivitis, trachoma and episcleritis as bilateral, keratitis bilateral except when due to traumatism, herpes and the subsequent dendritic form, syphilitic iritis bilateral, other forms uncertain, cyclitis usually bilateral, traumatic iridocyclitis bilateral and productive of sympathetic inflammation, all

chorioidal affections bilateral except acute plastic chorioiditis. Cataract, congenital subluxation of the lens, glaucoma, retinitis due to systemic causes, and diseases of the optic nerve when due to systemic or central causes are bilateral. Retinal lesions due to vascular changes when there is no kidney disease may be monolateral. Detachment of the retina in one eye will probably be followed by detachment in the other except when it is due to one sided myopia. One sided atrophy of the optic nerve can occur only as the result of some compressing lesion anterior to the optic chiasm.

M. L. F.

Ophthalmoscopic Appearances in Chronic Cyanotic Polycythemia.

JACKSON, EDWARD, Denver, Col. (*Ophthalmology*, October, 1907), reports an important case of a Jewess, aged 60, who on Aug. 21, 1901, reported that she had suffered from "heart disease" for many years. Her lips were purple, there were small varices on the cheeks and passive hyperaemia of the conjunctiva. The vision became blurred after reading some time and the eyes filled with tears, though they did not overflow. The media were clear, the retinal veins were very large, dark, tortuous and double the size of the arteries which were normal. No other fundus lesion was present, V. O. D.=4/VI. V. O. S.=4/XX. April 24, 1902, passive congestion of the conjunctiva, pupils unequal, V. O. D.=4/IX. V. O. S.=4/LX. great dilatation of left central retinal vein at nerve head. March 6, 1903, vision still failing, V. O. D.=4/XV. V. O. S.=P. L. only, pupils unequal and left pupil not reacting to light. Physical examination showed marked dyspnoea upon slight exertion, marked cyanosis of lips and tongue, slightly less upon the hands, trunk and limbs, tortuous veins almost black in appearance over the face, respiration 30, pulse 84, temperature normal, pulse strong, regular and of increased tension, arteries moderately atheromatous, the heart slightly large, sounds all sharp and clear, moderate oedema of the feet and legs, very slight if any enlargement of the spleen. The urine amounted to 2,000 cc. in 24 hours, s. g., 1012, albumin 0.5 per cent. by weight. The blood was very dark and coagulated very quickly. Red corpuscles = 9,949,600; white corpuscles =

6,500; haemoglobin at 170 and 200. June 19, 1903. Ophthalmoscope showed disks red and hazy, three small round retinal hemorrhages, with faint shaded borders. No changes in vessels beyond those already noted. Sept. 21, 1903. No changes were noticed. In June, 1904, she died after a few hours illness of acute cardiac failure. The patient's mother is reported to have had similar discolorations of the face in her latter years. Most of the 50 or more cases reported showed enlargement of the conjunctival veins together with those of the face and other parts of the body. The dark color and dilatation of the retinal veins have been noted in all. The arteries were normal or nearly so, great changes in the spleen have been present in some cases, but absent in others. The author suggests that such a condition might arise from a primary lesion of the general venous system, leading to venous dilatation and stasis, with secondary compensating increase in the number of blood cells and the percentage of haemoglobin.

A. F. A.

Rhythmical Alterations in the Width of the Palpebral Fissure of Both Eyes Probably Produced by Spasm of the Levator Palpebrae Muscles.

VEASEY, C. A., Philadelphia (*New York Medical Journal*, Jan. 18, 1908), reports the case of a child seven and one-half years of age in whom had been observed for some months an upward movement of each upper lid that occurred about twenty times in a minute, sufficiently great in extent to uncover the cornea and expose the sclera above. The movements were much more marked at times than at others, but were especially bad when something occurred to make the child nervous. The movements were rhythmical in character and were in all probability due to contraction of the levator muscles. The frontalis was not involved nor were there any changes in the pupils. Occasionally there were slight contractions of the alae of the nose. Adenoids had been removed some months before, and the patient had also been circumcised.

The patient, who had only 6/9 vision in each eye, caused by a simple hyperopic astigmatism, was refracted under atropine and the glasses ordered to be worn constantly. This gave considerable relief, as the contractions of the lids

did not occur so frequently, but the movements did not entirely cease until the patient was placed upon ascending doses of Fowler's solution of arsenic. M. L. F.

Sarcoma of the Eyelid.

WIEDER, HENRY S., (*New York Medical Journal*, Nov. 23, 1907), reports a case of sarcoma of the eyelid which he met with in an infant seven weeks old. He presents an excellent bibliographic index to the literature on this subject. M. L. F.

A New Pathogenic Micro-Organism of the Conjunctival Sac.

McKEEN, HANFORD, Montreal (*Ophthalmic Record*, October, 1907), after reviewing the work done by Koch, Weeks, Morax, Axenfeld and others, on the bacteriology of the eye, describes in detail the culture of this new bacillus.

An infant nine months old had been brought to the Montreal General Hospital for treatment of its eyes which had been sore and running for five days. Both eyes were involved, upon the lashes was much dried secretion, the palpebral conjunctiva was intensely congested, the bulbar quite normal, while from the conjunctival sac there came a profuse muco-purulent discharge freely mixed with tears. A little of this discharge was smeared over a glass slide, fixed and stained by Gram's method, using as a counter stain a weak solution of safranin. When the slide was examined there were tiny Gram negative bacilli which seemed too short and thick for the Koch-Weeks bacillus, and too thick for the influenza bacillus.

Within a month nine such cases were presented at the out door department; they were all from the Jewish colony; they have all shown definite characteristic clinical features and from each case this same bacillus has been isolated.

In making a smear a loopful of the conjunctival discharge should be teased well over a glass slide, fixed and stained, preferably by Gram's stain, using as a counter-stain a five per cent watery solution of safranin. Gram's stain is especially useful in conjunctival work, eliminating immediately the Gram positive bacilli. Examination of the smear shows tiny bacilli short and thick with rounded ends, which

seem to prefer to lie singly, but may be found in groups, and are present both within and without the leucocytes.

From culture this bacillus seems to be slightly larger and tends to appear as diplobacilli. It is short and thick, with very pointed ends, is 0.5-2.0 microns long by 0.3-0.4 microns wide. It shows uniform staining, has no capsule, is non-motile and does not form spores. It is decolorized by Gram's stain, but stains well with weak solution of carbol-fuchsin or methylene blue. It grows only at body temperature and is aerobic. It grows best on haemoglobin-agar of 1.0 and 1.75 acid reaction. The growth on haemoglobin-agar is very easily affected, and the cultivation at times becomes difficult. In commensal relationship with staphylococcus albus the bacillus grows well. It grows on dorset egg medium, glycerin and hydrocele agar. It is pathogenic for the human conjunctival sac, and as a cause of conjunctivitis should be differentiated from the other known bacteriological causes of conjunctivitis.

In conjunctivitis caused by this micro-organism the lids are reddened and oedematous; there is intense injection of the bulbar conjunctiva with profuse muco-purulent discharge.

In conclusion the writer says we have to deal with a new form of conjunctivitis set up by a new etiological factor which resembles the bacillus of influenza, but differs from it in media, viability and pathogenicity. O. W.

The Treatment of Trachoma with Boracic Acid Powder Without Massage.

NOYES, GUY L., University of Missouri (*Ophthalmic Record*, October, 1907), writing of the use of boracic acid powder in the treatment of trachoma, says that in the early and acutely inflammatory stages this treatment is not so useful as in the later stages, and that when scar formation is beginning in the palpebral conjunctiva, provided there is no profuse suppuration, acute iritis or corneal ulceration, boracic acid powder has been found more curative than operative measures or astringents. In non-inflammatory trachoma, treatment with this powder is very efficient after the roller forceps operation.

The writer asserts that he has seen cases of trachoma of

from two to ten years' standing subside quite promptly and the lids become relatively soft and pliable when this treatment was substituted for other methods.

The method of applying the powder is very simple. The patient is seated as for ordinary examination of the eyes; the upper and lower lids are held in eversion, and the patient directed to close his eyes, as the effort to do so tends to crowd the fornix of the conjunctiva into view, and renders the application of the powder possible to the whole surface of the conjunctiva, except the bulbar portion. The powder is dusted on the conjunctiva from a camels-hair brush, the handle of the brush being tapped with the index finger of the hand in which it is held. When the conjunctiva is deeply covered with the powder the lids are released. When the lids have resumed their normal position a pledget of cotton moistened in a cold, bland solution is placed over the eyes, an application which adds materially to the comfort of the patient.

O. W.

The Radical Cure of Vernal Conjunctivitis.

FOX, L. WEBSTER (*Ophthalmic Record*, November, 1907), describes the symptoms of vernal conjunctivitis in detail and refers to Drs. Cheatham, Thaler, Goldzieher and others as to the etiology and pathology of the disease.

In describing his treatment he says the first case on which he operated was one which had resisted all known remedies and had been treated by various ophthalmic surgeons.

The details of the operation are as follows:

"The upper eyelid is grasped along its margin by Darier forceps, and the edge being turned upon itself, the lid is everted until the retrotarsal fold is brought into view. A horn spatula should be inserted beneath the lid to protect the cornea. The exposed part is first thoroughly scarified with a three-bladed scalpel. The granular tissue is then scrubbed with a tooth brush which has been steeped in a corrosive sublimate (1 to 500) solution just before being used. Immediately after scrubbing the part is washed with a solution of the same strength. Another portion of the lid is now unrolled and the scarifying and scrubbing and wash-

ing repeated until the whole conjunctival surface of the eyelid has been subjected to the treatment.

This treatment was given in twelve cases, in ten of which the disease had not existed for more than five years, and in these cases the cure was permanent.

In the opinion of the writer the sooner the operative treatment is resorted to after diagnosis is positively established the better is the result. O. W.

On Disease of the Tarsus and Lid Margin in Trachoma.

RAEHLMANN, E. WEIMAR (Abridged translation from the German Edition, by Fridenberg, Percy, *Archives of Ophthalmology*, November, 1907). The writer's last ten years' experience justifies the conclusion that in inveterate trachoma there is an early development of trachomatous tarsitis which keeps pace with the various phases of the disease and has a decided influence on its course. The first clinical sign is a change in the secretion of the Meibomian glands, and as long as the development of granulations is limited to the fornix folds no change in this secretion is observed. Hyperaemia of the intermarginal portion of the lids about the Meibomian glands is another marked symptom, and this irregular thickening plays an important role in the development of trichiasis. Microscopic examination shows that even in the early stages of trachoma inflammatory changes are not limited to the palpebral conjunctiva, as small round cell infiltration can invariably be followed into the tissues of the tarsus. The trachomatous process may come to a standstill in the conjunctiva and persist in the depths of the cartilage as a typical trachomatous tarsitis, leading at times to a complete destruction of the glandular structures. The most marked deformity occurs where the middle of the tarsus has been most deeply affected, while the margins still retain some toughness. H. G. G.

Keratitis Disciformis.

ZENTMAYER, W., Philadelphia (*Ophthalmology*, October, 1907), reports three cases which closely resembled this form of keratitis. The first was caused by a pustule of the cornea in variola, involving about three-fourths of its central area

and causing a prolapse of Descemet's membrane, leaving, after a long period of irritability, a central oval opacity which involved the whole thickness of the cornea. Numerous faint feathery riders extended to the periphery. The second case was caused by herpes of the cornea, having a similar central oval opacity. The use of dionin modified the condition in both. A third case was due to an injury by a fragment of hot metal. This was followed by a similar disc-like scar.

A. F. A.

The Significance of Pupillary Inequality.

HANSELL, HOWARD F., Philadelphia (*Ophthalmology*, January, 1908), says that the value of inequalities of the pupil in the diagnosis of nervous diseases is problematic, unless they are a part of a well-defined symptom complex. The long list of diseases and the conditions which show pupillary inequalities and the wide variations in the condition of normal pupils raise a doubt in regard to the value of this one symptom in a differential diagnosis. It is important to distinguish between the various forms of mydriasis. In spasmodic mydriasis the reactions to light and convergence are preserved, faradic stimulation of the skin does not always increase the dilatation, mydriatics exaggerate it, miotics slightly reduce it, the palpebral fissure widens, the eyeball protrudes, occasionally there is increased lacrimation, anaemia of the retina and paleness of the side of the face corresponding to the dilated pupil. This is a chain of phenomena which may be assigned properly to irritation of the sympathetic system. Spastic miosis, on the other hand, probably has little to do with the sympathetic system except in rare cases of hysteria. Paralytic mydriasis is, with few exceptions, a symptom of paralysis of the pupillary branch of the third nerve or of destruction of the ciliary ganglion. All of the reactions are abolished except possibly the reflex from excitation of the skin on the same side, atropine and eserine are without effect, and it is often associated with paralysis of the other branches of the third nerve. Functional mydriasis is found in many diseases in which the cerebrospinal system is primarily not involved. The connection between the mydriasis and the disease is usually very difficult to trace. The combination of uni-

lateral mydriasis with corresponding loss of accommodation presents many difficulties of diagnosis. As a rule it signifies an early stage of organic change in the central nervous system, although it may be ascribed to disturbances of circulation, particularly in the absence of other signs of disease. When no ocular or orbital cause may be assigned the lesion is usually said to be in the nucleus of the ciliary nerve and iris or in the fibers connecting these nuclei with the trunk of the nerve or further back in fibers radiating to the cortex. Eventually some of these isolated paralyses of the iris or ciliary muscles progress until other and all branches of the third nerve are involved, and finally they point to a central tumor or other cerebrospinal disease. This is well illustrated by the following history: H. B., aged 12, in 1886 noticed inability to read, although the right pupil had been alternately dilated and normal for nearly a year. When the patient came under observation it was widely dilated and unresponsive. The left pupil was responsive and not dilated, although both ciliary muscles were paralyzed. No muscular insufficiency; full acuity of vision. In two years the left pupil became dilated. The degree of accommodation varied, but became permanently abolished in 1897. He died in 1901 of locomotor ataxia. In this case the ocular symptoms long antedated the appearance of the classical signs of locomotor ataxia. In other cases these conditions might be produced by a narrowing or closure of one or more terminal arteries to the nuclei, a local endarteritis, a minute clot or a small syphilitic deposit rightly placed in the orbit.

A. F. A.

Advantages and Disadvantages of Simple Extraction of Cataract.

COBURN, EDWARD B., (*Medical Record*, September, 1907), discusses the advantage of the simple method of cataract extraction as opposed to extraction with iridectomy. He describes the simple method of the operation which he divides into five parts or steps, and says that every step is debatable, and results may vary according to the judgment of the operator in performing the different steps. He enumerates the advantages of this procedure, as

an avoidance of unnecessary traumatism; fewer instruments are required for the operation; the anterior chamber is free from blood; the iris protects the wound from tags of capsule and particles of lens matter, and serves as a curtain to prevent prolapse of the vitreous; the lens is removed in the shortest possible time, and the help of an assistant is not required; convalescence is shorter; the iris responds to stimulus; visual results are better, as a round pupil prevents spherical aberration of the periphery of the cornea and of the correcting lens; when the pupil is round and central the normal appearance of the eye is retained; it is the easiest method of extraction.

The writer mentions in detail the several disadvantages charged against this method. He says that while it is true that the corneal section must be more carefully placed to avoid secondary prolapse of the iris, the operators who cannot control the location of their corneal section have no right to operate by any method.

The writer refers to the statistics of Dr. F. W. Ring, which show that perfect success and average vision are greater in simple extraction, while iritis, prolapse of the vitreous, suppuration and total failure are more common than in the combined method.

O. W.

A New Procedure and Instrument for the Artificial Maturation of Cataract.

CLAIBORNE, J. H. (*New York Medical Journal*, December 14, 1907), presents the following instrument for the laceration of the capsule to induce maturation of an immature cataract. It resembles somewhat a keratome with the blade 9 mm. long and 3 mm. wide. The nose of the instrument is slightly blunt, and on the under surface there are six cambric needle points, one at the apex, two on each side in a series, and one in the center between the two latter series. These points are so sharp that they can readily lacerate the capsule by the gentlest pressure, and are not sufficiently long to enter deeply into the lens substance and cause it to protrude through the lacerated area. The blade should be pushed in until the nose just touches the border of the sphincter below. Since the anterior needle point is 1 mm. from the apex, the danger of wounding the iris does not

exist when the instrument is in skillful hands. He thinks it wise to repeat the act of laceration twice, and more or less in the same planes, drawing the instrument up toward the wound until the shoulders of the blade commence to emerge. The purpose should be to lacerate the capsule in a gentle way from the lowest possible point to the periphery. The advantages of this method may be summed up thus:

- (1) Greater ease in lacerating the capsule.
- (2) Greater area of laceration.
- (3) The less likelihood of iritic complications and the less extensive if they do occur.
- (4) The presence of a coloboma to forestall the occurrence of glaucoma or its relief in case it does occur.
- (5) The less likelihood of postoperative glaucoma.
- (6) Simplification of the final extraction.

M. L. F.

Angiosclerosis of the Eye.

LAMB, R. S., Washington, D. C. (*Ophthalmology*, January, 1908), reviews the anatomical and historical structure of the eye and mentions the causes of angiosclerosis as congenital anomalies, syphilis, faulty metabolism, toxic agents, including alcohol, tobacco and the toxins of the organisms of acute infectious diseases. The earliest pathological change with the slightest disorganization of the vessels is a transudation into the contiguous tissue. In the retina this causes an oedema that may be limited to the nerve fiber layer and is readily remedied, but if it affects the outer nuclear layer, complete recovery cannot take place. Next the inflammatory process appears in the choriocapillaris, next in the medium-sized vessel layer, next in Haller's layer, and, later still, degenerative and proliferative changes are found in the sclera. The symptoms noticeable to the patient are muscular weariness, headache, scintillating scotoma, slight or prolonged blindness or blurred vision which usually brings the person to the consulting room. The objective symptoms are a conjunctivitis, partial ptosis, nystagmus, blepharospasm, possibly a marked pulsation of the temporal arteries and carotids and a high arterial tension. The earliest ophthalmoscopic changes are a hazy disk and retina, possibly obscuration of the capillary vessels with apparently nodes where they cross the disk or approach the macular region, with

tortuosity and, later, white lines bordering the larger vessels, arterial pulsation and perhaps spasm, aneurysmal dilatation, perhaps hemorrhage, into the retina and chorioid, chorio-retinitis, neuro-retinitis or any of the ophthalmoscopic signs of degenerative or proliferative changes. The fields are liable to be contracted in proportion to the amount of destruction present. It is well to call attention to the fact that probably similar changes occur in the cerebral vessels and that the condition of the retinal vessels is of prognostic value. The prognosis is good or bad according to whether the disease is seen early or late, as early treatment is very satisfactory. The treatment requires the co-operation of the patient to an unusual degree and consists of the correction of digestive disturbances by diet, lavage, catharsis, regulation of the blood pressure, restriction of fluid intake, reduction of the ingestion of salt, administration of nitrites and iodides, pilocarpine, baths and packs, strychnine or nux vomica and, locally, hot, moist applications and diopnin. The sequel of angiosclerosis of the vessels of the eye may be any disease that can possibly result from degeneration of the vessels, retinitis or chorioretinitis, cataract, glaucoma, embolism or thrombosis. A. F. A.

A Rare Type of Peri-Vasculitis Retinae in a Young Woman, the Subject of Inherited Syphilis.

OLIVER, CHARLES A., Philadelphia (*Ophthalmic Record*, November, 1907), reports a case of a rare type of peri-vasculitis in a young woman, the subject of inherited syphilis, which he studied through the courtesy of Dr. George Roher, of Lancaster, Pa., who had first seen the patient when she was eight years old. At that time the vision in each eye was normal. Six years later the fundus of the right eye showed old spots of absorption due to retinitis. Three years later the corrected vision of the right eye had fallen to two-sevenths of normal and there were marks of old and new hemorrhages in the retina. In one year's time the vision of the right eye had increased, to one-half of normal, and in three years receded to two-fifths. The left eye never evinced any trouble.

The patient's father had been epileptic for three or four years before his death at the age of 35. An autopsy proved

the correctness of a diagnosis of syphilitic brain tumor previously made by Drs. Weir Mitchell and W. H. Hammond.

The face, teeth and skull of the patient were slightly characteristic of hereditary syphilis. Careful correction of the error of refraction gave a vision of one-half of normal with the right eye and of normal with the left.

The writer considers this case interesting, both from its subjective and objective standpoints and says he knows of but one similar case, and that was brought to his knowledge by Joseph Schoebl, Prague, Austria.

O. W.

On Optic Neuritis of Intraocular Origin, Especially in the Form Due to Acute Plastic Chorioiditis.

GRADLE, H., Chicago (*Ophthalmology*, January, 1908), calls attention to some cases of optic neuritis in which the nerve is involved in connection with chorioidal disease. This form is rarely mentioned in ophthalmic literature. The form under consideration is central circumscribed chorioretinitis of self-limited course, with a moderate involvement of the nerve. It begins with dimness of one eye, which reaches its climax in a few days, clearing more or less in from two and one-half to six weeks. The lesion as seen is a simple patch of chorioidal inflammation of small size and moderate intensity, generally near or bordering on the disk. In practically all instances punctate deposits are formed on Descemet's membrane. The real diagnostic interest centers on the fact that the seat of the inflammation makes it probable that infectious material reached the chorioid through one of the posterior ciliary arteries from a suppurating maxillary sinus, an endometritis, or from an unknown source, and that the tissues were evidently able to overcome the infection after a short and limited reaction. Two histories are quoted in illustration.

A. F. A.

Treatment of Partial Optic and Retinal Atrophy by Electricity and Massage.

WURDEMANN, H. V., Milwaukee, Wis. (*Ophthalmology*, January, 1908), reports that further experience enables him to add to the preliminary paper of 1906, both in the number

of case histories and general deductions and to fully substantiate the claims therein made. He claims that partial primary optic atrophy, consecutive to optic neuritis and to chronic retinitis, can be checked, the nutrition brought back to the nerve, the disks made to look more normal, the visual acuity and the fields greatly enlarged and the patient preserved as a useful member of society in the greater majority of cases. In optic nerve atrophy, the disk is reddened by the cathode and particularly by the combined treatment, and the visual acuity and field are increased, thus proving that nutrition is immediately affected. That the increased functional effect may be made permanent it is essential that the hyperplasia of connective tissue be confined to the ocular end of the nerve and does not extend beyond the apex of the orbit. Ocular massage by the various methods and with the usual remedies has been beneficial. Forcible digital massage has given good results in embolism of central vessels. Digital and mechanical massage certainly reduce the tension in glaucoma. The continuous current at the anode also relieves the pain and tension of the disease and assists absorption. The high tension faradic current produces the same result. In optic nerve atrophy the disk is reddened and stimulated by the cathode and particularly by the combined treatment, but is more pronounced in massage than by electricity. Mechanical massage by the Victor transformer and Pyncheon attachment seems to be the best method. This gives alternate compression and suction, thus pulling the globe in and out, and the force of the stroke is easily regulated. General treatment with large doses of iodides, also at times strychnine, was used in the majority of cases, but this was apparently not the exciting or main factor of the cures, for in the majority these had already been tried without success. The best results were obtained with the combined galvanic and faradic current, and the high tension faradic. The negative pole is applied directly over the eye and the positive to the nucha. Five to ten milliamperes were tolerated from three to five minutes per day for weeks and even months. Patients have, as a rule, about one month of daily treatment, then tri-weekly for one to two years. Any acute inflammation of the eye contraindicates the use of electricity and massage in ocular disease,

for both methods produce hyperaemia. Then follows full case histories of seventeen patients, including one from toxic amblyopia, two from retinitis pigmentosa, one following thrombophlebitis, one simple primary atrophy, three post-papillitic atrophy, one a sequel to acute albuminuric retinitis, five post-syphilitic papillitic, all of which were benefited and one tabetic, one traumatic and one from cerebral degeneration, which were not suitable cases and were not benefited. These fourteen cases are among the few reported ones of optic nerve atrophy which have improved under treatment and the improvement is ascribed mainly to the betterment of the nutrition of the retina and optic nerve by electricity and massage.

A. F. A.

Posterior Sclerotomy as a Preliminary to Iridectomy in Secondary Glaucoma.

ZIMMERMANN, C., Milwaukee, Wis. (*Ophthalmology*, October, 1907), says that although posterior sclerotomy has been recommended in primary glaucoma, in cases with very shallow anterior chambers, it is equally valuable and oft-times necessary in secondary glaucoma. A case illustrative of this condition is reported in full. In a large majority of cases the iridectomy is made immediately after the scleral puncture, but in case of severe chronic inflammation of the uveal tract a few days' interval may be desirable. Too much delay, however, will cause loss of the benefit to be obtained by scleral puncture.

A. F. A.

Experience with Simple Glaucoma.

YOUNG, H. B., Burlington, Iowa (*Ophthalmic Record*, December, 1907), presents his views as to the distinguishing marks between inflammatory and non-inflammatory glaucoma, as well as to the measure of relief obtainable by operative and non-operative treatment, and cites two cases which he has had under observation. In the first case the patient was seen regularly for six months, during which time the instillation of pilocarpine, together with a general hygienic regimen prevented progress of the disease and permitted more use of the eye. The writer says he has never seen inflammation and rapid loss of vision in cases of in-

inflammatory glaucoma in which the prodromals were very short and the pupils normal, and describes such a case which he has had under observation for twelve years, and which has gone twenty-three years without total blindness or disturbance of the anterior segment. In the opinion of the writer the prospects from either method are more for palliation than for cure, and their relative value is a matter of choice between the risks of sudden total loss, post-operative cataract or "dazzlings" and remote chances for permanent relief. He, however, asserts that in cases showing a dilated sluggish pupil with shallow anterior chamber, steamy cornea, pain or rapid loss of vision, the balance is entirely in favor of the operative method. O. W.

Glaucoma in the Young.

VEASEY, C. A. (*New York Medical Journal*, January 4, 1908), reported in 1903 a case in which simple glaucoma appeared in one eye in the sixteenth year of age and progressed to total blindness in the nineteenth year. Three and a half years after the case was reported, seventeen years after the appearance of glaucoma in the first eye, glaucoma appeared in the second eye. Dim vision was noticed three months before coming under treatment, and in spite of the local use of miotics and the internal use of strychnine and nitroglycerine, at the end of eight months there remained but a small amount of excentric vision and the field was contracted to a very limited area. Operative treatment was declined as often as proposed. M. L. F.

Sympathetic Irritation Following Mules' Operation.

EMERSON, LINN, Orange, N. J. (*Ophthalmic Record*, October, 1907), reports a case of sympathetic irritation following Mules' operation in a girl 11 years old. The eye had been pierced with a sewing needle; no treatment was undertaken until panophthalmitis was well marked. Active treatment having failed to relieve, a corneal incision was made to evacuate the lens and purulent material. When the eye became quiet it was eviscerated and a glass ball implanted. Three months later an artificial eye was fitted and was worn with comfort for nearly three months, when

the patient complained of lachrimation and photophobia that lasted for another three months. After failure of other treatment, including atropine, hot water, rest, dark glasses, correction of refractive error and several changes of artificial eye, although no irritation of the stump was visible, the sclera was incised and the glass ball allowed to escape. There were a few drops of straw-colored fluid in the cavity, the ball was perfectly smooth and the cavity healthy. Relief was prompt and there has been no return of the trouble.

O. W.

A Case of Pulsating Exophthalmos, Ligation of the Common Carotid, Death.

JACK, EDWIN E. (*Ophthalmic Record*, October, 1907), reports the following case: A woman, aged 53, struck her right temple against a door, but at the time paid no attention to the injury. Two days later the lids and the tissues around the eye were swollen, and there was an increasing exophthalmos with frequent vomiting and dizziness associated with a terrible noise in the head. The lids were chemotic, the exophthalmos was decided with marked pulsation. The stethoscope revealed a bruit over the temple, and both pulsation and bruit were checked by pressure on the carotid. The conjunctiva was injected; the cornea clear; the pupil did not react; the fundus was not visible. The following day the exophthalmos and the swelling were increased; the conjunctiva was chemotic and serum was forced through it; the pain was intolerable. Dr. H. H. Germain tied the right common carotid, the effect of which was to immediately stop the pulsation and bruit; the exophthalmos diminished slightly; and there was difficulty in swallowing after the operation. The next day there was hemiplegia and delirium. A general examination by Dr. W. H. Smith revealed only moderate cardio-vascular disease. The eye symptoms improved, but the general condition became worse, and the patient died four weeks after the operation.

The pathological diagnosis given by Dr. Verhoff was: Aneurysm of the right internal carotid artery with recent perforation into the cavernous sinus. Oedema of the right cerebral hemisphere. Compression of the right optic nerve

by the sclerosed carotid artery with degeneration of the papillomacular bundle.

The writer refers to the literature on the subject, and says from his experience with ligation of the carotid, one would welcome any other procedure attended with less danger.

O. W.

Pulsating Exophthalmos Treated by Excision of a Dilated Orbital Vein.

GIFFORD, H., Omaha, Neb. (*Ophthalmology*, October, 1907), remarks that the usual treatment of pulsating exophthalmos by ligation of the carotids is frequently ineffectual and at the same time not free from grave danger. The substitution of ligation of the superior ophthalmic vein was first proposed by Szimanowsky in 1897. Later several surgeons performed the operation with good results. In the present case the results were equally satisfactory. A. B., aged twenty-four years, on December 2, 1901, was struck on the head and rendered unconscious. Six months later he noticed a prominence of the left eyeball, and soon after complained of a throbbing noise in his head. The ligation of the external, and later of the internal, carotid and of a much dilated vein of the upper lid failed to give him relief. November 11, 1905, the pain had become so severe and the swelling of the upper lid and conjunctiva so great that it was decided to remove the tumor above the eye, under the impression that it was a dilated vein. It was dissected out and proved to be a much enlarged vessel as large as a horsechestnut filled with solid blood. The symptoms improved and disappeared. A later operation for the ptosis gave him a useful eye with V.=20/xxx. The tumor seemed to represent a much dilated portion of the superior ophthalmic vein. From this and the other cures referred to, it would seem that this operation might become the operation of choice, in preference to the ligation of the carotid.

A. F. A.

Blindness Following the Injection of Protargol into the Lacrimal Sac.

LEWIS, F. PARK, Buffalo, N. Y. (*Ophthalmic Record*, December, 1907), reports the following case: The patient, a

woman of fifty years, stout, with flabby tissues and a low degree of resistance, had suffered for some years from dacryocystitis. When first seen by the writer the tissues around the eye were greatly swollen, an abscess had broken on the face from which a fistulous opening remained for the discharge of pus. Within a week or ten days probing could be successfully accomplished, but the sac continued to discharge and was washed out with a 25 per cent solution of protargol. There was no reaction, and the same procedure was followed the second day, after which the swelling slightly increased, but without discomfort. Two days later it was learned that a severe pain had developed shortly after the treatment, which had continued, and that the eye had become blind. Examination showed a slight proptosis, some swelling of the orbital cellular tissue, soreness and pain, with difficulty in moving the eye. The pupil was dilated and immobile. There was no light perception. The retinal vessels were slightly congested and the disk markedly reddened. The ruptured sac had allowed the protargol to enter the orbital tissues which intensified a cellulitis already existing, and involved the optic nerve. The inflammatory symptoms disappeared, leaving the eye blind. Five years later the optic nerve is still blanched and there is no light perception, but the eye is in every other respect normal.

O. W.

Retrobulbar Orbit Cyst Treated by Kroenlein's Operation and the Application of Carbolic Acid.

GIFFORD, H. (*Western Medical Review*, October, 1907), reports the case of a boy eight years old whose left eye suddenly became exophthalmic. Conservative treatment was first tried and failed to give relief, Krönlein's operation was then performed and a dark tumor was seen in the muscle funnel. This was ruptured during manipulation, a large quantity of dark brownish fluid escaped, and after this had been cleaned away nothing more could be seen or felt of the tumor, so the outer wall of the orbit was replaced and the wound allowed to heal. In three months there was a recurrence, which necessitated a repetition of the operation, and this time the tumor was found to be a cyst, apparently multilocular, which led down the inner side of the optic

nerve to the apex of the orbit and contained the same sort of dark brown fluid as before. The cavity of the cyst was swabbed out with dry swabs, then with 95 per cent carbolic acid, and finally with alcohol. The bone was replaced, and recovery took place with slight reaction. Two weeks later the vision was 20/30—. The exact nature of the tumor remained undetermined.

M. L. F.

On the Use of Paraffine Spheres in Tenon's Capsule, with the Report of Thirty-Nine Cases.

SPRATT, CHARLES NELSON, Minneapolis, Minn. (*Ophthalmology*, January, 1908), reports seventeen cases, with one failure from extrusion in a man seventy-five years of age. Twenty-three cases were reported previously. The spheres are prepared as follows: Paraffine with melting point about 60 degrees C. is filtered through ordinary filter paper into large test tubes. These are sterilized by steam, transferred into warm bichloride solution, cut into pieces, rolled into spheres 2 cm. in diameter. They are handled with rubber gloves and preserved in a weak bichloride solution. Paraffine has the advantages that it is well borne by the tissues, is cheap, easily worked, and not likely to be broken like glass. Occasional failure comes from septic cases, panophthalmitis or idiosyncrasy. Difficulty also arises from using too large spheres, improper closure of the wound, injury around the optic nerve, too soft paraffine, lack of asepsis. The operation is done as follows: Under general anaesthesia, the skin about the eye and face is cleaned with soap and water, alcohol, ether and bichloride solution. The sac is flushed with 1:5000 bichloride solution. A double layer of gauze with an opening over the eye is placed over the face and ether cone. This prevents contact of the hands or sutures with the cone, hair and face and aids in the maintenance of a clear field of operation. Infection is sure to be followed by failure. The conjunctiva is divided close to the limbus, dissected back beyond the insertion of the recti muscles, which are picked up on a strabismus hook, grasped by small forceps and separated from the surrounding tissue. The globe is enucleated in the usual manner. A paraffine ball is dipped in sterile water, if necessary cut to the proper size and placed in Tenon's capsule. The superior and inferior recti

are sutured together, likewise the two lateral recti. An additional suture is placed so as to include each muscle at the crossing of the two loops. Tenon's capsule is closed by a catgut purse-string suture. The conjunctiva is then closed with purse-string, making in all three layers over the ball. A firm gauze dressing is placed over the eye. This is changed daily for four or five days. A pressure bandage lessens the subsequent chemosis, which lasts from five to seven days.

A. F. A.

Can a Substitute for Simple Enucleation Be Employed in Every Instance?

SUKER, GEORGE F., Chicago (*Ophthalmology*, January, 1908), asserts that unless the surgeon makes an effort to produce a prominent stump after enucleation, he is not doing full justice to his patient. For that reason simple removal of the eye is slowly losing ground. The objections to simple enucleation are, (1) it leaves an extremely large cavity, (2) the upper lid falls back into the orbit and the lower frequently droops, (3) the stump movements are imperfect, (4) the movement transmitted to the shell is slight, (5) a vacant stare is always present, (6) the space between the stump and shell is large and fills with secretions which decompose and cause inflammation, (7) adhesions frequently form, contract and nearly obliterate the cul-de-sac, so as to render it difficult to wear or even insert a shell. A suture stump is better than nothing, but the Mules or the Frost operation furnishes the best substitute. Of these, the Frost offers better results because it is of more general application, the globe is less often extruded, there is less reaction, no danger of sympathetic irritation because the eyeball is removed, a better cushion is formed by granulation tissue, which does not form in the sclera, and there is almost no danger of suppuration. Of all materials lead free glass balls seem to be the best.

A. F. A.

The Killian Frontal Sinus Operation; Its Relation to Ophthalmology.

LONGWORTHY, H. G., Dubuque, Iowa (*Ophthalmology*, October, 1907), says that so radical a surgical procedure as

the Killian frontal sinus operation should be understood by all ophthalmologists. The characteristics of such cases of inflammation of the frontal sinus as present eye symptoms are tumor just above the inner canthus, exophthalmos downward and outward and little, if any, pain. Diplopia is not constant. The exophthalmos is due to the pus breaking through the inner wall of the orbit. The orbit swelling is found to be firm, elastic and fluctuating. Nasal examination is often negative. Sometimes the only eye symptom is oedema of the upper lid, chiefly of its inner half. The X-ray plates are a valuable aid in diagnosis and make clear the size and location of the frontal sinus and something of its condition. It is best to make at least two lateral and one antero-posterior plate. The pathological picture is somewhat as follows: During an acute inflammation of the mucous membrane lining the sinus there occurs a discharge of a considerable quantity of serous fluid. The cavity being insufficiently drained, the oedema of the membrane persists, blocking the ostium. The infected serum soon changes to pus. The membrane and bony wall begin to thin and sometimes the retained secretions escape into the orbit. The operation of Killian produces the least disfigurement, requires but nine or ten days after treatment, and is comparatively free from danger. The usual frontal incision is made through the eyebrow and extending down the side of the nasal bone. The frontal sinus is opened and the bony plate cut away in the orbit and nasal cavity, leaving a bridge of bone along the brow, saving the pulley of the superior oblique muscle, if possible. The limits of bony removal are usually the trochlear attachment and supraorbital margin above, the anterior ethmoid vessels behind and the lacrimal groove below. The ethmoid cells are curetted and the whole of the middle turbinal is removed, if necessary. Any part of the floor of the frontal sinus can be reached and curetted. The ethmoid region is packed with gauze, draining the frontal sinus. The wound is sutured. The sutures are removed on the fourth or fifth day. There is usually no recession of the globe, no diplopia, no interference with the function of the lacrimal sac, no infection of the globe and vision is unimpaired. There is, however a tendency to atrophic rhinitis, chronic laryngitis, etc., following such

destruction of turbinate tissue and substitution of scar tissue.
A. F. A.

**The Fogging Method Applied to the Treatment of
Eye-Strain.**

FRIDENBERG, PERCY, New York City (*Ophthalmology*, October, 1907), calls attention to the method of causing the accommodation to relax by placing before the eye an over-strong + lens and then gradually replacing with a weaker one until the refraction in each meridian is corrected and the vision becomes clear. This frequently gives an accurate estimate of the manifest error but does not show latent faults. The author also notes that in certain cases of so-called incurable eye strain an overcorrecting lens, will give relief from reflex nervous symptoms, when well fitted glasses have failed to do so. Later, when the spasm of accommodation is relaxed the proper correcting lenses may be used.
A. F. A.

**A Preliminary Statistical Inquiry Into the Refractive and
Some Pathological Conditions of the Eyes of Five
Hundred Men Above Sixty Years of Age.**

GREENE, D. W. (*Ophthalmology*, January, 1908), contributes a statistical inquiry into the eye conditions and blood pressure records of 500 men over sixty years of age, with an average age of over seventy years. The purpose of the paper is to show the relation or association, if any, of arterial sclerosis and hypertension to the intraocular conditions or diseases to which a large proportion of these men are subject. The blood supply of the eye, considering its importance, seems comparatively limited—only three small arteries enter it, and three of its most important parts have no direct blood supply. Obviously, any disease which narrows the caliber of these vessels or reduces the elasticity of their walls will affect the circulation of the blood through them, the nutrition of the structures will suffer and degenerative changes result. The diffuse form of arterial sclerosis attacks by preference the small terminal arteries. The average age of the men of this series is seventy to seventy-six years. The average blood pressure for the

whole 447 men whose blood pressure was taken was 163.6 m/Hg. They represented about fifty different kinds of employment and may be grouped under two classes. In the first class of 371 men, who had followed hard and laborious callings, only 123, or 33.15 per cent had blood pressure less than 160 m/Hg., while 248, or 66.85 per cent had pressure from 160 to 280 m/Hg. In the second class of 142, who had followed professions or the lighter trades, 65 or 45.8 per cent had blood pressure of less than 160 m/Hg., and 77, or 54.2 per cent had pressure above 160 m/Hg., which seems to demonstrate that the kind of life a man has lived has more influence in determining what his physical condition and that of his arteries will be at sixty years of age than the number of years he has lived. The comparison of the regular drinkers and the temperate men shows that the influence of alcoholic drinks in the causation of arterial disease has probably been over-estimated and does not compare with tobacco, when used to excess. Those acknowledging specific history gave an average blood pressure of 185 m/Hg. for the whole number, which is a higher average of blood pressure than any class presented, the highest six giving an average pressure of 237.5 m/Hg. The statistics showing the relationship of age, blood pressure and lens opacity is the most important set of the series. Of the 504 eyes with opacities of the lens only 16, or 3.2 per cent. were in men who had blood pressure of less than 130 m/Hg., 30.3 per cent had blood pressure between 130 and 160, averaging 138.9 m/Hg., 332, or 66.5 per cent, practically two-thirds, had blood pressure from 160 to 290, with an average of 179.7 m/Hg., 50, or 9.9 per cent, were classed as mature cataracts, 102, or 20.2 per cent, as incipient cortico-nuclear, 255, or 50.6 per cent, as incipient cortical, 84, or 16.7 per cent, as incipient nuclear, 7, or 1.4 per cent, as post-polar, 4, or 0.8 per cent, as capsular and 2, or 0.4 per cent as traumatic. The 255 eyes with incipient cortical cataract, at an average age of 69.4 years, had blood pressure ranging from 110 to 250, averaging 163.8 m/Hg. In every case the opacity showed first in the lower half of the periphery, with a marked tendency toward the inner quadrant. There were 84 cases of incipient nuclear cataract with an average age of 72 years and blood pressure between 130 and 250, aver-

aging 139. m/Hg.; 102 eyes, with incipient cortico-nuclear cataract had an average age of 71.9 years and blood pressure ranging from 160 to 280, with an average of 168.5 m/Hg.; seven eyes with post-polar cataract had an average age of 68.1 years and blood pressure averaging 161.4 m/Hg.; two traumatic cataracts were 65 and 71 years respectively and blood pressure of 165 to 185 m/Hg.; four capsular cataracts averaged 70.3 years old and blood pressure from 125 to 180, averaging 154 m/Hg.; fifty mature cataracts had an average age of 68.5 years and a blood pressure from 130 to 210 with an average of 161.3 m/Hg. Of 441 men, or 82.2 per cent, showing some degree of chorioido-retinal disturbance around the disks, 31.7 per cent had blood pressure below 160 and 68.3 per cent above 160 m/Hg. Tortuous retinal arteries were observed in 5 per cent, and 8.2 per cent showed compression of the retinal veins where the hard arteries crossed them. None of these had a blood pressure under 130, and it ranged to 280 m/Hg. Papillitis and hemorrhages were observed in 1 per cent. with blood pressure from 160 to 200 m/Hg. 62.3 per cent showed hypermetropia of some form and 4.6 per cent myopic error; 3 per cent had black eyes, 34.6 per cent blue, 30.1 per cent grey, 19.2 per cent hazel, and 13 per cent brown. The average pupillary distance was 6.2 cm., or 2 7/16 inches, the average diameter of the cornea was 12 mm., the average size of the pupil was 3.3 mm., and homatropine about doubled the normal size of the pupil.

A. F. A.

A Further Study of the So-Called Horopter, Making Ocular Rotations Easy of Understanding.

SAVAGE, G. C., Nashville, Tenn. (*Ophthalmic Record*, December, 1907), says that Helmholtz made three fundamental errors in his study of optics. First, in the construction of the optic axis, second, in the construction of the visual axis, third, in the conclusion that all lines of direction are the axial rays of cones of light which cross at the nodal point. That the horopter may be understood and its significance appreciated, the conditions underlying binocular single vision must be known. The law of binocular single vision is the law of corresponding retinal points and is founded on an anatomical basis. Helmholtz erred in teaching that axial

rays of light are lines of direction; this error being the result of his incorrect location of the poles of the eye. The true law of direction is "Every line of direction is a radius of a retinal curvature prolonged."

The visual axis is the true optic axis; all lines of vision intersect the visual axis at the center of the visual curve which is the center of rotation; the cone at the posterior pole of one eye corresponds with the cone at the posterior pole of the other eye.

The law of binocular rest and motion is: "The ocular muscles must so regulate the two eyes that the two visual axes and the two horizontal retinal meridians shall always lie in the plane of the primary isogonal circle, and that the two visual axes shall intersect at some point on this circle, in the interest of both binocular single vision and correct orientation."

In every binocular rotation the ocular muscles have one common task to perform; the keeping of the two visual axes and the two horizontal meridians in the plane of the primary isogonal circle and the converging of these axes on some point on this circle.

O. W.

ABSTRACTS FROM ENGLISH OPHTHALMIC LITERATURE.

(GREAT BRITAIN AND THE ENGLISH COLONIES.)

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Iridocyclitis.

CROSS, F. RICHARDSON (*Ophthalmic Review*, December, 1907), after a most careful description of the blood supply and the secretory function of the irido-ciliary region, takes up the clinical appearance, causation and treatment of iridocyclitis.

Under the heads of clinical appearances he treats of vitreous opacities, serous cyclitis, plastic and purulent iridocyclitis.

Clinical Appearances. Vitreous opacities are sometimes observed as a fine haze in the anterior part of the vitreous, just behind the lens, and dots or fine thread may be seen floating in it, a condition probably due to an exudation from the ciliary vessels or Collin's glands. Unless the fibers of the vitreous body are structurally injured, such haze behind the lens is temporary or so slight as to be unobserved.

Chorioiditis may or may not be associated with vitreous opacities, which when present are probably to a large extent dependent on implications of the ciliary body.

Serous cyclitis may consist merely of excessive secretion from the ciliary vessels, or consist essentially of a catarrhal inflammation of the ciliary body and glands. There is congestion of the ciliary blood vessels with circumcorneal hyperemia, and increase in the aqueous fluid, which becomes fibrinous, and may contain a few leucocytes with pigment epithelium. The more solid particles wash into the meshes of the filtration angle, or are seen as punctate spots on the back of the cornea.

"When the secretion is albuminous, it does not really exude, and it may distend the aqueous and produce a form of glaucoma (aquocapsulitis) which needs paracentesis of the chamber. The iris becomes discolored, but few if any synechiae are formed."

Such cases subside without deterioration of sight, but have a tendency to recur. "We see serous, catarrhal, hemorrhagic or plastic exudations, according to the control of the ciliary blood vessels or the conditions of the blood."

Recurrent iridocyclitis, "cold in the eye," if well treated, may exist for years without any permanent synechiae being formed. Such attacks should be looked upon as "recurrent iritis," and treated as such.

Another type of iridocyclitis resembles interstitial keratitis. The cornea is unaffected, excepting for the presence of punctate spots on its posterior surface, but it eventually results in a gradual and more or less complete recovery. The cases are essentially chronic and continuous, often binocular. Evidences of syphilis are not present.

Plastic iridocyclitis. Symptoms are more severe and the exudation is fibrinous and associated with the presence of leucocytes. It lines the surface of the ciliary body, passing forward among its processes, and back along the pars non-plicata and retina. "A hypopyon may be chiefly cellular and fluid, or fibrinous, according to the composition of the exudate."

"The pigment cells may break up and pigment escape. The exudation spreads in all directions, the leucocytes proliferate and form new cell material; new blood vessels are also formed. As the exudation continues to develop, it forms layers; to-

ward the ciliary body it tends to be fibrous, toward the vitreous cellular, and fibrinous between the two."

The future progress of the exudation depends on the progress of the original irritation, which has been its cause. Removal of the irritant or cessation of the inflammation leads to diminution in blood vessels and checking of existing diapedesis. But the exudate already existing can only be slowly absorbed; if large, the portion toward the center of the vitreous tends to undergo fatty degeneration, which may be accompanied by softening of the vitreous body.

Fibroblasts develop along the uveal tract from the fixed connective tissue, organize and affect the eyeball, according to the portion of the eye affected.

The lens may be bound down from behind by lymph and cyclitic membranes, or in front by synechiae. Ciliary body or retina may be detached, the posterior chamber may be completely obliterated. Shrinking of the globe may follow, but if there has been no external wound and is not painful, it may usually be safely let alone.

The tension in iridocyclitis is variable, but, as a rule, it is increased during the inflammatory stage, diminished in the later stages.

Purulent iridocyclitis. After injuries to the eye, or in patients in a very low state of health, the inflammation may be acute and the exudation purulent, usually resulting in panophthalmitis. Sympathetic ophthalmia presents a typical picture of iridocyclitis.

Causation. "Iridocyclitis is usually the effect of a constitutional dyscrasia depending on organisms, an incident is a general infection rather than a disease." A blood poisoning associated with syphilis (inherited or acquired), tubercle, rheumatism—gonorrheal (not common), rheumatoid arthritis.

Iridocyclitis may complicate the retinitis of albuminuria or diabetes, also the toxic poisoning of gastro-intestinal or vaginal inflammations; pyorrhoea alveolaris or sepsis in the nose or accessory cavities may also be a causative factor.

"Mumps and typhoid fever have been complicated by iridocyclitis, and typhoid bacilli have been found in the aqueous humor. Cerebrospinal meningitis may cause it."

The author asks the pertinent question: "Is sympathetic ophthalmitis due to the action of certain specific eye cytotoxins?" After mentioning the results of the experimental

work of Santucci, he adds: "Iridocyclitis thus appears to be essentially an endoinfection depending probably on microbes. But the effects of cold, slight injuries to the predisposed eye, ocular fatigue from overwork, or light may be the exciting causes."

Lastly, the author mentions wounds as a cause of iridocyclitis, which when in the "danger zone," are liable to be followed by sympathetic cyclitis. The progress in the injured eye may be due to traumatism or infection.

Treatment.—The wound should be treated antiseptically, care being taken to remove all foreign particles and crushed tissue; applications of the cautery may be advisable. In all cases rest of the eye and of the patient. Subconjunctival injections of 4 per cent sterilized salt solution, the author believes, increase the antitoxic effect of the normal nutrient humor.

Sterilized air has been injected under the conjunctiva 1 to 2 cc. as a dose. The use of leeches and the administration of a hydragogue purge. Paracentesis of the anterior chamber may be beneficial when tension is subnormal, also when there is much congestion and exudation. Tearing of the synechiae with a spud may occasionally be associated with paracentesis. Iridectomy may be necessary, but should not be done during the acute attacks. It is indicated in cases of high tension, but may be beneficial when tension is subnormal, when there is haze or floating opacities in the vitreous.

The author quotes Grandclement, who draws attention to an inflammation of the iris, which is confined to pigment layers, "iritis uvéene," for which he says iridectomy is an unfailing remedy.

In conclusion, the author calls attention to the necessity of accurate diagnosis and application of appropriate remedies not only to the eye, but also to the faulty state of the general condition to which the ocular affection may be secondary.

A Study in Optic Neuritis in Connection with Nasal Accessory Sinus Disease.

FISH, HENRY MANNING, Chicago (*British Medical Journal*, Nov. 1907). After speaking of the great interest the subject of his paper has aroused during the past few years, the author reviews the more interesting of the 100 cases he has collected from literature and adds thirty-six of his own

cases of primary and secondary optic neuritis with all degrees of visual disturbance, from a papillitis with no reduction in vision to loss of light perception.

Contrary to the generally accepted theory each one of the nasal sinuses, the frontal and maxillary, as well as the ethmoidal and sphenoidal, can cause an optic neuritis. Characteristic of the result of proper treatment in these cases is the rapid disappearance of the nerve edema and consequent improvement in vision.

The author emphasizes the fact that "cold in the head" is the most common type of acute sinusitis. Sinus disease is usually bilateral, hence should be thought of in cases of double optic neuritis. Chronic sinusitis may lie dormant for months or years, only to become suddenly active during the inclement weather that predisposes to colds.

Dizziness occurred in nineteen out of twenty-six cases. Pain may or may not be present. Two cases never suffered any pain whatever.

A purulent nasal discharge is very frequently wanting, while nasal congestion or engorgement of the turbinate bodies is very suggestive of sinus disease. An involvement of the external muscles was present in 33 per cent of the cases. The author gives the following named three cardinal symptoms of closed sinusitis, dizziness, pain, either dull or severe, and nasal congestion. His claims and results, are well given in the following quotation:

"The pathologic anatomists report that sinus disease is very common and the clinical cases cited above show that it can give rise to an optic neuritis; theoretically, then, it should be a very frequent cause of an affection of the optic nerve. Three years ago the writer conceived the hypothesis that idiopathic ocular lesions were often but the symptoms of an affection in the surrounding cavities, and in all cases of optic neuritis the nostrils were examined, and in the recent cases the sinuses were treated, even though in some instances there were no intranasal evidences of sinus disease present. The results were surprising as well as gratifying, as in a series of thirty-six cases sinus disease was found to be present twenty-six times. The direct causal relationship was shown in the fifteen cases by improvement in the ocular condition following drainage, and, on a priori grounds, the eleven remaining

cases were also attributed to the same cause, although the connection could not be demonstrated by any ocular improvement, as most of the cases presented more or less optic atrophy, while in others the treatment as advised was not undergone. It is conceded that some unknown etiological factor, as, for instance, an intracranial lesion, may have been present in some of the cases in this second series, but remember, gentlemen, that sinus disease can cause a bilateral optic neuritis, dizziness, pain, and vomiting, symptoms that have in several cases led to the diagnosis of tumor cerebri, and yet at the autopsy no tumor was found.

The proper examination of the sinuses would greatly reduce in number the etiologic factors of optic neuritis. This pathogenesis of the cases due to a cold has already been referred to. According to Hanke, Pearce, Wolff and others, an empyema is found at the autopsy in the majority of the cases of measles and scarlet fever. In thirteen influenza autopsies Weichselbaum found an empyema of one or more of the sinuses twelve times, in the one exception—the first case—the sinuses were not examined. In the eleven influenza cases herein reported the optic neuritis was traced to sinus disease ten times; in the one exception—with the initial coryza, anosmia, dizziness, and severe pain that induced vomiting—craniectomy was performed, but the sinuses were not properly examined, although the writer strongly urged it; the case terminated in bilateral amaurosis. In the writer's opinion, the more appropriate term for these various cases would be optic neuritis due to sinus disease following influenza, scarlet fever, measles, etc., as the case may be. This hypothesis would explain the appearance of the ocular lesion, as a rule, during convalescence, or in some cases, long after recovery."

Idiopathic facial erysipelas is considered by the writer as but an evidence of a streptococcic or staphylococcic infection of the aural, buccal or nasal cavities, and the frequent fatality, as to both vision and life is because "two symptoms are held to bear the relation of cause and effect; and the therapy is directed toward the relief of a symptom rather than the real cause."

Syphilis may give rise to optic neuritis secondary to a sinus empyema, and many of the cases classified as hereditary he thinks are secondary to sinus involvement.

In speaking of the cases of optic neuritis that recover spontaneously or by treatment other than that directed to the sinuses the author calls attention to the fact that sinusitis may be self limited and quotes several cases to prove his point.

Two primary and one secondary case of glaucoma are reported as due to sinus involvement, all of them being greatly improved by treatment directed to the sinus after all local eye measures had failed. Other cases are mentioned to prove the great importance sinus infection bears to glaucoma.

NOTE.—This paper is a very important addition to ophthalmic literature and covers a possible etiological factor in optic neuritis only too frequently entirely neglected.

Some Cases of Vernal Catarrh.

BUTLER, T. HARRISON (*The Lancet*, November 9, 1907). He states that spring catarrh is not uncommon in Palestine and Syria. The differential diagnosis between it and trachoma may be difficult. In many cases the two diseases coexist. He brings out nothing new either as regards the diagnosis or the treatment which latter consists chiefly in massage with the yellow oxide of mercury. Pedunculated growths should be removed with scissors, large granulations with Knapp's roller forceps and Volkmann's spoon. This followed by thorough massage with yellow oxide of mercury has given him the best results. Copper sulphate he thinks does harm. He reports four cases but they present nothing new or unusual. He makes no mention of the x-ray treatment.

Treatment of Epithelioma with the Roentgen Rays.

SCHIFF, EDWARD, Professor of Radiology at the University of Vienna (*The Lancet*, November 23, 1907). As all oculists meet with occasional cases of epithelioma of the lids, this subject should prove of interest to them. The literature on the subject, data placed at his disposal by his friends and his own observations and experience have led him to form the following conclusions:

1. "The favorable effect of Roentgen rays on epithelioma is indisputable.
2. The treatment with Roentgen rays must not, however, be considered in a category by itself; it must rather be looked

upon as an alternative or as an addition to treatment by other methods.

3. There are obviously biological differences in the various kinds of epithelioma which have so far not yet been sufficiently explained pathologically and anatomically and on which the success of the Roentgen treatment is dependent.

4. To aid the effect produced by the Roentgen treatment small operations may be done and the cautery applied according to the nature of the case.

5. In those cases in which no favorable influence is produced by the Roentgen rays, at the latest after the fourth or fifth sitting, this treatment must be discontinued, as little more is to be expected from it.

6. The intervals between the single sittings must not be too long; a more active Roentgen light—medium soft tube—with, of course, a careful covering of the healthy parts of the skin, is to be recommended.

7. In the case of surgical operations a subsequent application of rays is eventually desirable.

8. It is of an especial importance to lay stress on the fact that by the application of Roentgen rays the patient is saved from an operation, and the result produced by the Roentgen treatment is not only equally good as regards the cure but much better as regards the subsequent appearance.

Synchronous Movement of the Lower Eyelids with the Tongue and Lower Jaw Observed in Certain Diseases.

ROBSON, H. J. (*The Lancet*, December 14, 1907). "The phenomenon referred to is a slight eversion of the lower eyelids made evident upon protrusion of the tongue or depression of the lower jaw, the lids resuming their normal state when the tongue is retracted or the mouth shut—in other words, the lower eyelids become displaced from the eyeballs or are protruded from the eyeballs to the extent of one or two millimetres upon protrusion of the tongue or depression of the lower jaw." This phenomenon is apparently never present in health. It apparently comes and goes with the onset and cure of disease, and is therefore an index or sign of disease. It is produced by the contraction of the malaris fibers of the orbicularis palpebrarum muscle. He thinks it will be often found present in acute cases as a transitory sign indicat-

ing a severely ill condition of the patient. When found in chronic cases, according to his experience, some severe asthenic condition will be found to exist or it will be learned that the patient has been a sufferer from severe pain for many years. The phenomenon disappears after the tongue has been protruded several times. It is usually present in both eyes.

Tuberculin Ophthalmic-reaction of Calmette.

EYRE, WEDD AND HERTZ (*The Lancet*, December 21, 1907). The opinion of those who have investigated this reaction appears almost unanimous as to its value, but the presence or absence of tuberculosis does not appear to have been substantiated by the results of other methods of investigation in a sufficient number of cases to enable the unbiased observer to place implicit reliance upon the recorded results. In selecting their cases for the test, the authors endeavored to obtain a variety of clinical material in which it was probable that the result recorded by the use of the tuberculin might be controlled and confirmed or disproved by some other method of investigation. They suggest three classes of reactions, as follows:

Class 1, comprising only such cases as those in which the reaction is confined to marked injection and tumefaction of the caruncula and plica semilunaris and some lacrimation. Class 2, including cases of marked injection of the vessels of the whole of the bulbar conjunctiva and marked lacrimation, accompanied by the changes in the caruncle mentioned under class 1. Class 3, including cases of severe reaction, injection and tumefaction of caruncula and plica similunaris, intense injection and chemosis of the bulbar conjunctiva, accompanied by abundant mucofibrinous exudation and marked epiphora.

The date of onset of the reaction is by no means constant, but a reaction if present could always be observed if the eye is examined and compared with its fellow at the end of twenty-four hours. As a routine measure the diagnosis should be based upon the appearance twenty-four hours after the application of the test.

The subjective symptoms noticed have been trifling even when a very acute conjunctivitis was present. The reaction usually passes off in four days, sometimes it persists

longer, and in some few cases even from seven to ten days. In only one case was there severe pain in the region of the eye. It is necessary to repeat the test in suspicious cases which at first fail to react before definitely excluding tuberculosis, as they found one case which responded positively to the second though negatively to the first test. It is an interesting fact observed by them and others that the reaction cannot be obtained even in undoubtedly tuberculous cases during the last week of life. Extended tables are appended.

Major Smith's Operation for Extraction of Cataract in the Capsule.

WILLIAMSON, J. RUTTER (*The Ophthalmoscope*, October, 1907). The author writes upon this operation after having seen Major Smith perform it nearly two hundred times. To show that the favorable results in these cases are not due to the character of the patients or the surroundings, he states that the patients are extremely dirty, and though the air is laden with dust, Major Smith perforce operates with windows wide open and with forty to fifty patients huddled close around the operating table. In reply to the criticism that these patients are content with poorer vision than would satisfy our patients, the fine filigree work done by them is evidence of the good vision resulting from the operation. They rarely accept even a + 1 D cyl. for astigmatism. They are usually operated upon within an hour or two of their arrival.

Carbolic acid is used for the face and also for the instruments which cannot be boiled. Corrosive sublimate 1-2000 is used to irrigate the eye. The point of the knife is entered at the limbus 1 mm. above the horizontal meridian, and emerging at a corresponding point, the knife is brought out half way between the normal pupil and the sclero-corneal junction. The speculum is then removed. A trained assistant here becomes very essential, as he holds the lids open, the upper by means of a strabismus hook used as a retractor. The surgeon, with a flat spoon or vectis in his left hand, inserts it underneath the upper lid to help in raising the lid and not for counter pressure. He uses the convexity of a strabismus hook for pressure upon the cornea over the

junction of the lower with the middle third of the lens. The pressure is directed to the back of the eye, and when the lens has started is varied toward the free edge of the wound. The pressure is moderate, slow and continuous. If the expulsion be attempted too rapidly, the capsule is liable to burst. Should this happen, it is best to keep up the pressure with the hook so that the capsule does not retract and try to gently drag it out with forceps applied to the part outside the wound. During this manipulation the patient is not spoken to or asked to aid in any way by looking up or down. Usually the patient will turn his eye high up. While this seems to be an awkward position, the extraction can quite well be performed with the eye turned in this direction, provided the assistant properly holds the lids, and it is the position of greatest safety for the patient as far as the risk of vitreous escape is concerned. The majority of his cataractous lenses emerge high up under the upper lid. In the few cases where vitreous escaped, it occurred when the patient had persistently looked downward during the manipulation. The iris is replaced, if necessary, and the lids gently closed. No atropin is instilled, except for special reason. Both eyes are bandaged. The patient is always carried to bed. Most patients leave the hospital on the sixth or seventh day. He now usually does an iridectomy. His method is ingenious. After the incision is made, he dimples in the cornea close to its free edge with one limb of the iris forceps, thus causing the edge of iris to appear outside the wound; at the same time the other limb which is resting on the sclerotic above is slid along so that the iris is lightly caught in its grasp, pulled outside and cut off, the whole being effected without introducing instruments into the interior of the eye. In the whole operation only one instrument enters the eye, a knife, and that only once. If vitreous escapes, the flat spoon which is in readiness under the upper lid is slipped in beneath the lens to hold it against the cornea and remove all pressure from the vitreous, withdrawing it gradually as the lens emerges, as the result of the slight pressure applied to the cornea by the strabismus hook. The vitreous when prolapsed should be cut off level with the corneal surface. The loss of a bead or two of vitreous does not seem to impair the results ma-

terially. His experience seems to be that unless the vitreous loss be very considerable, it makes little if any difference to the quality or permanence of the after results, provided no infection has been introduced. He has about 6 per cent. of prolapses, and if he thought the matter of prolapses more important than iritis and secondary cataract, he says that with selection of cases he could keep it down to 2 per cent. He employed this method of operation in 94.6 per cent of his cases. The advantages of the operation are summed up as follows:

1. No after-cataract to be dealt with, causing the patient disappointment that the one operation was not enough, and necessitating further absence from home and work, as well as the risks attendant upon the treatment of such after-cataract.

2. Lessened risk of iritis from there being no lens-matter left behind.

3. No need of introducing instruments, such as iris forceps or irrigator. This minimum of instrumentation must also mean a minimum of risk of inflammatory and infective processes.

4. The ease with which immature cataracts can be removed at one sitting.

5. The shortened period of stay in hospital, due to the absence of complications.

6. One might also add that the avoidance of a conjunctival flap in Smith's operation is certainly convenient in keeping the field clear from blood, and it does not seem to make healing the least bit slower.

Its disadvantages are:

1. Greater skill necessary for its performance.

2. An intelligent assistant requisite.

3. A real, though not vastly greater risk of vitreous escaping than in the usual capsule-laceration operation.

4. Possibly consecutive upon 3, is also a greater risk of remote retinal detachment.

5. Another possible, though as far as I can find out, and at present unproved risk is, that of great astigmatism from the larger flap requisite.

6. The larger wound certainly makes iris prolapse more likely, if there is not an iridectomy performed as part of the operation.

He considers it good practice, at first, to avoid extraction in the capsule of those bluish skim-milk colored lenses, which are known by experience to have very thin capsules; always to perform an iridectomy except in immature cataracts; to take plenty of time in the expulsion of the cataractous lens; and in every case where after fair trial the capsule seems certain to burst, to scratch it and to extract in the way most familiar to you.

Prolapse of Iris in Simple Cataract Extraction.

ROPER, A. C. (*The Ophthalmoscope*, October, 1907). This report is based on three hundred cases operated upon by Dr. Bankard and himself, and presents tables of the results. As to the incision, the puncture and counter puncture are made at the extreme edge of the cornea, and he cuts so as to leave a rim of clear cornea at the upper margin. Patients are kept in bed until the eighth day. The dressings are left unchanged forty-eight hours, except for some untoward symptoms. His general idea of treating prolapses is to excise quite early ones, to be guided by the amount of irritation caused and the lower margin of the pupil, as to whether he should excise those of the third, fourth, or fifth day or to wait to deal later with the cicatrix; and because it is so difficult to seize the iris, not to attempt it with very late ones, but to deal with the scar when it has been sufficiently organized.

Serums and Metallic Ferments in Ocular Therapeutics.

DARIER, A. (*The Ophthalmoscope*, October, 1907). He relates some experiences in treatment of infective keratitis with Romer's serum, antipneumococcic and antidiphtheritic, and also antitetanic serum and concludes that it makes little difference in the result which serum is used. The serum of an animal immunized against any of these toxins will be rich in all the elements of defense and when injected into the body of a patient affected with any infective malady, will aid the organism to rid itself of the particular infection. He never hesitates when faced with hypopyon-keratitis, or traumatic or operative intraocular infection, to practice three or four hypodermic injections of the Roux serum.

although he does not on that account neglect local treatment and he recommends it in all cases where one has reason to fear surgical complications of an infective order. He also proposes to try serotherapy for iritis. In all cases of infective ulcers of the cornea, panophthalmitis and infective post-operative complication he thinks it advisable to commence treatment with the serum and then to follow this up with a series of intravenous injections of collargol. His conclusion is that simple non-specific, antitoxic serotherapy should in the future be employed as an important agent in general therapeutics and in the prophylaxis in all infections, general or local, without prejudice to the usual local treatment. The Roux-Behring serum is at this moment the product which is easiest to procure and the one most worthy of confidence. It should be employed until such time as more extended researches have yielded precise indications with regard to the respective merits of the different serums and metallic ferments.

The Pathogenesis of Irido-Cyclitis.

STEPHENSON, SYDNEY (*The Ophthalmoscope*, October, 1907)
In our present state of knowledge it appears to him justifiable to claim that every case of irido-cyclitis is of septic or of toxic origin, which may be exogenous as is seen in irido-cyclitis that so generally accompanies pneumococcic ulceration of the cornea or that follows a penetrating wound of the eye infected by some septic instrument, or endogenous as seen in rheumatic, syphilitic and other infections of the eye. The *treponema pallidum* has been found in aqueous humour taken from an eye affected with acute syphilitic iritis. Specific microorganisms have been found in the aqueous humour in cases of irido-cyclitis due to certain well-defined bacterial causes. With regard to toxins the difficulties are greater, inasmuch as our chemical tests are as yet inadequate to recognize the existence of a single one of these hypothetical substances. This theory he thinks capable of explaining many points in the pathogenesis of irido-cyclitis that are not so clear as we might wish, although he does not claim that it represents the truth of the entire matter.

Rupture of the Pectinate Ligament.

BUCHANAN, LESLIE (*Ophthalmoscope*, November, 1907). He thinks this lesion is more frequent than the record of only eight described cases would indicate. The pectinate ligament is the true tendon of the ciliary muscle and forms the posterior wall of the canal of Schlemm, so that rupture of it implies displacement of the ciliary body and may also be regarded as at least a partial rupture of sclera which it re-enforces at its weakest point. It is usually a result of a blow with a blunt instrument. As a consequence of this lesion the ciliary body is no longer attached at the corneo-scleral margin and either slips back along the sclera or if the rupture is extensive falls back into vitreous. Hemorrhage takes place into the anterior chamber. There is some degree of laceration of the ligament of the lens and consequent dislocation of it. The canal of Schlemm generally becomes ultimately obliterated and in this way conduces to the production of glaucoma. Rupture of the iris and hemorrhage into the vitreous may frequently occur in connection with such accidents. In all cases seen the ciliary body at an early age began to atrophy. The blood in the anterior chamber usually masks characteristic appearances at first. When this is absorbed the anterior chamber will be found of uneven depth and the pupil no longer circular. If the rupture is small the pupil is displaced to one side somewhat simulating a coloboma though its margin is visible all around and there is a difference in the depth of the anterior chamber as the iris is pushed forward so that it lies close to the cornea at the apparent coloboma. If the rupture is extensive the iris may be separated from the ciliary body but it may retain its attachment to the ciliary body and be carried back with it into the new position in which event the anterior chamber will be very deep at the site of the injury. There is usually extreme mydriasis but the pupillary margin is visible all around until three or four weeks after the injury when from pressure the iris becomes atrophic. There is a great deal of pain due to the increased tension and traction on the ciliary body. The lens may be looked for in the vitreous chamber usually resting on the ciliary body below. The visual power is greatly diminished due at first to the opacities of the media

and later to the atrophic changes resulting from the high tension. In the less severe cases of injury the added rupture of the pectinate ligament makes a great difference in the prognosis, hence the importance of its recognition. Operative interference offers little hope.

Treatment of Alternating Squint.

COULTER, R. J. (*Ophthalmoscope*, November, 1907). In opposition to Worth, who states that the total absence of the fusion-sense renders a perfect cure of essentially alternating squint improbable, this writer records five cases of what he considers, with possibly one exception, typical examples of essentially alternating squint in which binocular vision was established at the ages respectively of 14, 10, 18 and 13 years, at which ages orthoptic treatment is supposed, as a rule to be useless, though in some cases he has not succeeded in restoring binocular vision of such a quality as to keep the eye straight. He has never failed to obtain fusion of stereoscopic pictures after correcting the deformity by operation, and he considers that in dealing with alternating squints which have become permanent, the best course, if the fusion-sense is not developed rapidly, is at once to correct the deformity by operation, but that in spite of the failure of previous orthoptic treatment, every effort should be made as soon as possible after operation to develop binocular vision by training with the amblyoscope or stereoscope. The most suitable time for undertaking such treatment is when the patient is between 12 and 16 years old.

A Series of Four Cases of Infantile Gangrene of the Cornea (Keratomalacia) in which the Spirochaeta Pallida was Found.

STEPHENSON, SYDNEY (*Ophthalmoscope*, November, 1907). Although the treponema pallidum has been found in syphilitic lesions in almost every part of the body, very few cases have as yet been reported in which it has been found in the eye. There can be little if any doubt however that it is the cause of all the so-called specific lesions of the eye. After giving a list of the few cases reported in

which the spirochaeta pallida has been found in syphilitic lesions of the ocular structures, he reports four cases of keratomalacia in syphilitic infants aged respectively 7 weeks, 9 months, and 3 months, in all of whom the spirochaeta pallida or an organism morphologically not to be distinguished from it, was found in scrapings from the affected cornea when stained by the Giemsa and the Proca-Vasilescu method. He finds that the latter yields the clearer microscopic pictures. In three of the cases the specific nature of the corneal gangrene was placed beyond reasonable doubt by the associated clinical symptoms apart from the results of the bacteriologic examination but in one case the discovery of the syphilitic nature of the process was not of an altogether conclusive character. He states also that spirochaetes have been found in tissues, as the cornea, iris and ciliary body, of seemingly unaffected eyes of syphilitic fetuses and babies by various observers.

The Diagnosis of Tuberculous Affections of the Eye by the Calmette Serum Reaction.

STEPHENSON, SYDNEY (*Ophthalmoscope*, December, 1907). The important part taken by syphilis in the production of many eye diseases has tended to make some of us perhaps a little oblivious to the influence of other causes among which tuberculosis is almost certainly one of the most important. The non-recognition of tubercle as the common cause of internal eye disease is doubtless due largely to the clinical difficulty of diagnosing tuberculous lesions when small or deeply seated. In such circumstances, physical examination, no matter how carefully carried out, often leaves us in doubt as to whether the patient is or is not tuberculous. Physical signs are present in a minority only of cases of tuberculosis of bronchial glands, and examination by x-rays is likely to succeed only when the changes are of a gross nature. If the condition is dormant, other symptoms may be entirely absent. Tuberculin inoculation is hedged about with certain restrictions and objections. It has recently been found that in tuberculous subjects vaccination of the skin with tuberculin produces a local reaction known now as the cuti-reaction which appears to occur only in tuberculous subjects. Calmette not long ago an-

nounced that tuberculosis may be diagnosed by the simple expedient of placing in one eye a single drop of 1 per cent aqueous solution dried tuberculin. In healthy subjects no reaction whatever follows the application. Tubercular individuals on the contrary show a local reaction, now widely known as the ophthalmo-reaction. His observations have been confirmed by many investigators until it is impossible to resist the conclusion that Calmette has endowed us with a simple, trustworthy, and harmless means of diagnosing tubercle in any part of the body. Positive results have been obtained in diseases of the eye by several observers whom he quotes. We must recognize that the finding of tuberculosis focus—for example in the glandular system—does not necessarily stamp an obscure eye disease as belonging to the same category. Here also a positive reaction after the injection of tuberculin can do no more than to suggest that a given eye disease is probably of tuberculous origin, and only then provided that other etiological factors, especially syphilis, can be excluded. What is more conclusive is the production of a focal reaction as regards the ocular disease itself, such as would be shown by an exacerbation of inflammatory phenomena, but this happens comparatively seldom, whether tuberculin is injected beneath the skin or dropped into the eye. As to details, ordinary tuberculin must never be employed since their contained glycerine is apt to irritate the eye and thus to simulate a true ophthalmo-reaction. The proper kind of tuberculin is now prepared in convenient form by several firms in this country. Stephenson has employed it in forty to fifty cases. The reaction in his experience corresponds with that described by Calmette. Three to six hours after the tuberculin has been used, the semilunar fold and caruncle become reddened and the eye becomes congested, and in a short time presents the signs characteristic of a more or less acute infective conjunctivitis. The reaction attains its height in from six to ten hours and disappears after eighteen hours in a child and from twenty-four to thirty-six hours in an adult. Chemosis is not present. The discomfort produced by the application is trifling. The patient's general state and appetite remain unaffected. There is no relationship between the intensity of the reaction on the one hand and the gravity of the tuberculous

lesions on the other. He has, however, seen a low grade of follicular inflammation persist in one instance for about twenty days, in another twenty-four days and in a third for at least forty-two days. It caused, however, no distress to any of the patients. In a fourth case a diffused dilatation of the lymph capillaries of the ocular conjunctiva outlasted the reaction by several weeks. In almost every instance it was noted that the reaction involved mainly the lower palpebral conjunctiva together with the lower half of the bulbar conjunctiva, the other parts of the mucous membrane of the eye being relatively much less affected. In several cases reaction was severe and lasted for a week or longer. On several occasions reaction was delayed and did not supervene for twelve to twenty-four hours after the application. Speaking generally, a positive reaction was obtained in every eye case where there existed clinical evidence of tubercle. Examination subsequent to the ophthalmo-reaction disclosed tuberculous foci in some instances where the latter had hitherto lain unsuspected. In another group of cases, careful examination failed to reveal any tuberculous lesion, although the Calmette reaction was obtained. Lastly, in many cases where there were no grounds for believing that tubercle existed, the Calmette reaction was negative. His experience leaves him under the impression that in the Calmette reaction we have been endowed with the most valuable means of recognizing tubercle. He confines his remarks in this article to three groups of cases:

1. Superficial Scleritis.—Four patients were tested. In two the reaction was absent but was decided in the other two. In one of these there were several groups of enlarged glands readily palpable and in the other physical examination revealed slight changes at the apex of one lung.

2. Irido-cyclitis.—Three cases with positive reaction.

3. Chorioiditis.—Seven cases. In three there was no reaction, in four positive reaction. In only one of these latter did general examination give evidence of tuberculous lesion, namely in the lungs.

Two Cases of Family Degeneration of the Cornea.

BUCHANAN, LESLIE (*The Ophthalmoscope*, December,

1907). After a description of the two cases he concludes that we here have two and possibly four members of a family of six otherwise healthy people suffering from an affection of the eyes, which is evidently a form of the "nodular" type of "family degeneration of the cornea."

Neither brother suffers from acne or from enlargement of the thyroid gland. Both are thin, wiry men, with pale color, and general appearances of emaciation. Both are bright, intelligent men of cheerful temperament, quick in movement and speech, and, considering their weight, physically strong.

In each case the first evidences of the condition became manifest after puberty was reached—in the elder man at 23 and in the younger at 19 years.

The apparent cessation of the advance of the condition after iridectomy may be only a coincidence, but is interesting.

The difference between these cases and other similar ones is in regard to the size of the spots and their remaining circular and discrete. In some cases, where the spots were large, they were confluent and no longer circular, whilst in others, where they were circular throughout, they were of small size. The roughening of the surface epithelium seems to occur in some but not in other cases, and probably depends on the depth at which the spots are situated.

In only one other observation, so far as is known, was there any note of the leanness which was so marked a feature in these two men.

So-called Filtering Cicatrices in the Treatment of Glaucoma.

HENDERSON, THOMSON (*The Ophthalmoscope*, December, 1907). The theory of filtering cicatrices is built on the belief of the possibility of establishing permanent leaking wounds; in performing which the accompanying iridectomy is done only with the idea of preventing prolapse. The whole theory of such incisions rests on a lack of appreciation of the process of repair that follows corneal and scleral wounds, and on a complete misapprehension of the way that the beneficial results of operation are obtained.

He describes the operations of Prof. Lagrange and Col. Herbert and shows the methods by which corneal wounds are healed, whether in the clear cornea or in the limbus, their being in either case the three stages. (1) mediate union, (2) primary union, (3) permanent union and cicatrization. Whatever the method of healing and wherever the wound may be located he believes there is no permeability of the wound after healing is completed, and in this belief he is confirmed by his microscopical examinations. The imbibition of aqueous by the wound's margin disappears within a few days and he thinks the clearing up of this diffuse haziness around the corneal wound is strong clinical evidence against the permeability of such wounds. The thickening of the episcleral tissue over the wound, instead of being a sign of filtration of the cicatrix, is nothing more than the surface hyperplasia of the episcleral tissue which has supplied the wound with cicatricial material. He has found upon microscopical examination of corneal wounds that the underlying wound was cicatrized and firm, precluding all idea of filtration. After an incision into the anterior chamber the endothelial cells grow along the internal margin of the wound and seal it. This endothelium when complete precludes all possibility of a permanent filtering cicatrix following any incision however devised.

The success of operation in glaucoma, in his opinion, lies not in the wound but in the accompanying iridectomy. Anatomical investigations show that while corneal incisions heal and cicatrize, the cut iris surface, forming the base and pillars of the coloboma, never undergoes any reparative process but always remains an open wound, as when first severed, so acting as a permanently open filtering area through which the aqueous fluid can drain away. The efficacy of this drainage area depends on the operation being done before atrophy of the iris stroma has progressed too far.

ABSTRACTS FROM GERMAN OPHTHALMIC
LITERATURE.

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**Contribution to the Question of Gram-negative Diplococci
of the Conjunctiva.**

BRONS (*Klin. Monatsbl. f. Augenheilk.*, January, 1907) discusses the question of the occurrence of organisms in the conjunctiva, resembling the gonococcus in being negative to the Gram method. He has been able to isolate six examples of such organisms and gives their characteristics. The details of the cultural peculiarities must be read in the original article. He believes that they are identical with the *Micrococcus catarrhalis*, and thinks that this organism, the *meningococcus* (*Diplococcus intracellularis meningitidis*) and gonococcus which are alike in staining peculiarities belong to one family, the gonococci being the most sensitive, and the *Micrococcus catarrhalis* the most resistant. This is the same view which has been advocated by Ghon and Pfeiffer, Czaplewski, v. Lingelsheim, Günther and others. The practical importance of the matter is that it may be impossible at times to determine from an examination of stained specimens of the conjunctival secre-

tion alone which organism is present, and the clinical appearance of the conjunctiva must be taken into consideration.

If there is a typical blenorrhoea, and the secretion shows masses of intracellular, biscuit shaped diplococci, the diagnosis of gonorrhoea may be made with the greatest probability. If the clinical condition is that of a light grade of catarrh, and the secretion shows only a few biscuit shaped organisms, some intracellular, others rather plump in form, and in extracellular groups, in combination with other germs, it may safely be assumed that the gonococcus is not present, but that probably we have to deal with the micrococcus catarrhalis. If there is a decided catarrh, it may be necessary to make cultures, but for practical purposes the microscopical examination of the secretion, stained by the Gram method, is sufficient for the diagnosis of gonorrhoea.

E. A. S.

The Origin and Clinical Peculiarities of Glassblowers' Cataract.

CRAMER (*Klin. Monatsbl. f. Augenheilk.*, January, 1907) discusses the various theories of the cause of cataract which occurs in comparatively early life among glassblowers and comes to the conclusion that the direct cause is the long existing action of the chemical rays of the strong light, to which they are exposed in their work, and that the heat is only a supporting factor. This, he thinks, explains better also the reddish-brown discoloration and pigmentation of the left side of the face, which is the side usually turned toward the furnace.

The main constituents of ordinary bottle glass are sand, sodium carbonate, and marl; the latter a mixture of calcium carbonate and clay. As Finsen has shown, limelight contains especially numerous ultraviolet rays, and it is probable that the mixture of the lime with the molten glass causes it to send out likewise many ultraviolet rays. These rays have been proven by Widmark to cause pigment deposits in the upper layers of the skin, and Cramer believes they may be assumed to be the cause of the cataract formation.

As the cataract usually appears on the left side first, and a long time before the right eye is affected, and the situation of the opacity at the posterior pole of the lens interferes greatly with vision, Cramer tried to hasten the ripening by trituration of the capsule, but abandoned the operation because it pro-

duced an unusually severe reaction. The capsule was easily ruptured and allowed the lens matter to escape into the anterior chamber. Even preliminary iridectomy caused an unpleasant and rapid swelling of the lens, which made the extraction more difficult. He believes the same cause which produces the cataract, alters the structures of the capsule and renders it less elastic and more readily torn.

For the protection of the eyes from the light rays Cramer advises placing before the furnace opening a shield in the form of a strong glass box, in the center of which should pass a canal just large enough to allow the tube with the molten glass mass to be withdrawn. The box should be filled with water colored with fuchsin or other coloring matter, through which the glassblower could determine the amount of glass on the tube. A layer of water only 7 mm. thick would absorb all but 8 per cent of the heat rays, so the box would not need to be very deep.

E. A. S.

Blepharoplastic Operation by Use of a Flap with a Pedicle From the Neck.

SNYDACKER, Chicago (*Klin. Monatsbl. f. Augenheilk.*, January, 1907) reports two cases in which he restored the eyelids, which were everted and adherent to the bone as the result of severe burn, by means of a flap of skin taken from the neck. Parallel incisions were made in the neck commencing 1 cm. below the angle of the jaw, and extending about 12 cm. downward nearly to the clavicle, along the line of the sternocleidomastoid muscle. The flap was about 2 cm. wide, and after separation below, was divided in the first case by an incision 4 cm. long into two end flaps which were turned upward and sutured into place to form the upper and lower lids, from which all the scar tissue had been dissected away. In the second case the flap was used to replace the lower lid.

In each case the flap was allowed to remain attached just below the jaw for seven days, the free bridge of skin between the attached portions of the flap being separated from the underlying skin of the face by numerous gutta serena strips, and covered with dry gauze. The wound edges in the neck were undermined, and readily drawn together. In both cases the flap retained its vitality and healed in place, giving a good result.

He thinks the operation is indicated especially where the surrounding skin is not in good condition, because of scar tissue or disease, to give a good pedicle flap, and prefers the pedicle flap to the Thiersch or Wolfe flaps, which have a tendency to shrink and be absorbed. He suggests the further modification of allowing the wound in the neck to remain open until the lid flap is healed in place, and then turning the unused portion of the flap downward again, and suturing it in its former place.

E. A. S.

Concerning Palliative Trephining for Inoperable Brain Tumors to Prevent Threatened Blindness.

SAENGER, ALFRED, Hamburg (*Klin. Monatsbl. f. Augenheilk.*, February, 1907), reports nineteen cases in which the skull was trephined in cases of brain tumor because of severe pain, and threatened blindness. In two cases good results were obtained only after widening of the trephine opening, so that more cerebrospinal fluid could escape. In two others no result was obtained, because the tumor was too large, and death quickly occurred. Only one case of basal tumor was made worse by the operation. In all the other cases the salutary effect was evident.

He mentions Finkh's statistics collected in 1904, of thirty-one cases from the literature, in which thirty showed a regression of the choked disc after trephining. In his own cases two patients were already blind before the trephining was accepted, an indication that the palliative operation should not be postponed too long. He chooses the time when the vision begins to fail. If the operation is done after this time, optic atrophy is apt to result.

For the site of the trephine opening he recommends the position over the tumor if it can be localized. If this is not possible, he advises a point over the right parietal lobe. He does not find from his experience that trepanation over the cerebellar hemisphere is as dangerous as was formerly believed. The operation must be done carefully and the dura not opened until some time after it is exposed. The other palliative operations, such as lumbar puncture, and puncture of the lateral ventricles, cannot be compared in effect with trepanation. In the present position of surgery, the operation is almost without danger in the hands of a skillful operator; he therefore recom-

mends it in every inoperable tumor to relieve the suffering of the patient, and especially to protect him from threatened blindness.

E. A. S.

Primary Tuberculosis of the Bulbar Conjunctiva.

REIS, LEMBERG (*Klin. Monatsbl. f. Augenheilk.*, February, 1907), describes a case of tuberculosis of the bulbar conjunctiva in a 16-year-old girl. The lesion was in the form of a solitary growth, about the size of a pea, which was situated on the nasal side, near the insertion of the internal rectus muscle. The eyeground showed vitreous opacities and hyperemia of the nerve head. No involvement of any other organ in the body could be detected. A sister suffered from an advanced pulmonary tuberculosis. The diagnosis was confirmed by microscopical examinations of the excised mass, by animal inoculation, and by injection with Koch's tuberculin (old) which gave both general and local reaction. Reis could find only ten cases of tuberculosis of the bulbar conjunctiva, if cases secondary to involvement of the palpebral conjunctiva were excluded.

In eight of these there was tuberculosis elsewhere in the body, and hence the infection was probably secondary and endogenous. The absence of evidence of involvement of other organs in the other two, and in his, makes him believe that ectogenous infection of the bulbar conjunctiva, while very rare, may occur. Examination of the other cases showed that in seven the infiltration was very near the corneo-scleral limbus, while in his and one of the other two, the tumor was at some distance from it.

He, therefore, argues that this localization, at a point distant from the terminals of the conjunctival branches of the anterior ciliary arteries, is of diagnostic importance in differentiating between endogenous and ectogenous infection.

In the treatment, he advises radical destruction of the lesion by the knife or galvano-cautery. This is not always successful, and a radical operation cannot be carried out in cases in which the foci are in the sclera walls or deep in the eye. Tuberculin injections and Roentgen-ray treatment take a long time, during which the local affection may cause general infection. For these cases he recommends enucleation, but admits that it is often impossible to obtain permission for this, especially if the vision is good.

E. A. S.

Foreign Body in the Vitreous. Lenticular Reflexes With Rainbow Colors.

ERTL, F., Klagenfurt (*Centralbl. f. prakt. Augenheilkunde*, Nov., 1907, vol. xxxi, p. 332), reports the following case: The patient three months before had been struck on the left eye by a piece of wood which was followed by a severe hemorrhage, and later inward deviation of the eye. Examination showed complete loss of movement outward. About 1 mm. from the upper limbus was a grayish-black projection of the iris about the size of a millet seed. The operation was successful, but it was subsequently observed that a piece of copper lay in the vitreous. The patient then remembered that two years before he had been struck in that eye by a piece of an explosive cap in a trick cigarette.

By direct light, a very dirty gray opacity of the anterior layer of the lens, resembling the sun's disc, could be seen. Its periphery could be seen only after instillation of atropin. By focal illumination, an area of the pupil of the size of a millet seed, lying in the middle of the lens, shone with a play of colors. This was at the position of the posterior lens' reflex. The anterior reflex showed a less distinct but similar play of colors. Transillumination showed the fundus entirely clear and red. Temporally and below the papilla were peculiar golden, wavy figures which could be followed to the macula. At the latter was a polygonal figure formed of glittering points of about $1/3$ of a disc in diameter.

At the operation a piece of copper nearly 1 mm. in size and of a quadrate shape was removed. Healing was normal.

On account of a return of the strabismus, another operation was done, correcting the position of the left eye almost entirely.

With a Hartnack's lens, the grayish disc in the lens was seen to consist of small granular constituents. The field of vision was contracted, for white on the nasal side about 20 degrees and in another direction about 10 degrees. The fields for green and red were also contracted. Central vision for color changed so that yellow was called white; light green, blue; dark blue, black; V. with $+ 2.25$ sph. = $3/24$.

It is probable that the chemical action of the copper caused disturbance in the nutrition of the iris and lens, especially the epithelium of the lens capsule. The considerable loss of vision, and distinct contraction of the fields of vision and the dis-

turbance in the recognition of blue-green points to a lesion of the deeper ocular structures due to chemical disturbance in the nutritive fields of the eye (chalkosis retinae of Goldzieher).

C. L.

Painless Subconjunctival Injections of Saline Solution.

ERB, ALBIN, Lugano (*Wochensch. f. Ther. u. Hyg. des Auges*, Oct. 3, 1907, Vol. xi, No. 1, p. 1). Erb finds that acoin, which he has used before the injection to anesthetize the eye, has sometimes a deleterious action and has substituted dionin, which renders the injection completely painless or almost so.

C. L.

Ablatio Retinae, Cutting of Vitreous Bands for Traumatic Detachment of the Retina.

ZIMMERMAN, Goerlitz (*Klin. Monatsbl. f. Augenheilk.*, Aug.-Sept. 1907). Zimmerman has frequently done Deutschmann's operation in cases of spontaneous detachment of the retina. He reports a case where detachment of the retina followed a magnet operation, and where reattachment of the retina followed its liberation from the vitreous traction.

C. L.

Ray Therapy and Ulcus Serpens—Experiments With Local Light Therapy in Ulcus Serpens Corneae.

HERTEL, Jena (*Klin. Monatsbl. f. Augenheilk.*, Aug. 1907). Light rays are very little employed in diseases of the eye, although the attention of the profession was called to them in 1903. They act on the tissues of the eyes in the same way as a chemical or thermal irritant, but the irritation is much less in rays with a long wave length than in those with a short wave length. They cause an excitation of cell function and finally its death.

Their action, however, is more rapid on lower organisms than on the cells of the vertebrates. If, therefore, it is desired to kill bacteria, the treatments should be frequent and short. If the tissue itself is to be affected, the treatments should be longer and more intense. Ferments and toxin are affected by the rays and their action is checked.

In addition to the direct action of the rays, there is the in-

direct, consisting, in the eye, of a conjunctival and ciliary hyperemia, edema and an increase in the bactericidal power of the aqueous, due probably to chemical changes.

Hertel used the magnesium spark, on account of the short rays which it gives forth, which do not injure the lens or the retina. The cases of *ulcus serpens* were treated with the usual, conservative methods, and those which were not cured (47 cases) were treated by the light therapy, in place of cauterization. In the beginning there was apparently an exacerbation, but this was at once followed by improvement and ultimate cicatrization. The scars were delicate—there was never a leucoma.

C. L.

How Shall We Protect Our Eyes from the Action of the Ultraviolet Rays of Our Artificial Lights?

SCHANZ, FRITZ, and STOCKHAUSEN, CARL, Dresden (*Wochensch. f. Therapie u. Hygiene d. Auges*, Oct. 3, 1907, Vol. xi, 1, p. 3). Stockhausen, himself, was presented as a case of *ophthalmia electrica*, due to ultraviolet rays. The ordinary protection of a plate glass was insufficient (in this case the patient's spectacles). The investigations of the authors showed that only the ultraviolet waves whose wave lengths were shorter than 300 microns were absorbed by the ordinary lamp and spectacle glass. Blue glasses are just the opposite of protecting glasses, as they transmit the ultraviolet rays especially well. The smoky-gray weaken but do not entirely absorb them. The authors found that with the increase of artificial lights in brilliancy or temperature goes an increase in the number of ultraviolet rays, causing the eyes to tire easily. The lens of the eye serves as a protection to the retina, but possibly itself suffers as a consequence, cataract being formed as in the case of glassmaker's cataract. The authors have succeeded in perfecting a glass which will protect the eyes from ultraviolet rays, and this will soon be brought into the trade.

C. L.

Ophthalmia Neonatorum.

SCHANZ, F. (*Wochensch. f. Therapie u. Hygiene d. Auges*, Oct. 3, 1907, Vol. xi, 1, p. 4). Schanz believes that the presence or absence of the gonococcus in the secretion does not necessarily imply a severe or mild case. The bacterial diag-

nosis is not always reliable because on the one hand the germ may be hard to find when present, and on the other hand, other germs may be mistaken for it. Furthermore, the gonococcus changes its characteristics the longer it remains in an artificial source of nutrition. The use of the Credé method is practically harmless. When injury results it is due to a mistake in the strength of the solution. C. L.

The Illumination of Rooms and Places for Working.

STOCKHAUSEN, KARL, Dresden (*Wochensch. f. Ther. u. Hygiene d. Auges*, Oct. 3, 1907, Vol. xi, 1, p. 4). Dazzling of the eyes varies with the brilliancy of the light and the extent of the surface of the illuminating body. The greatest amount of light that the eye can stand is a surface brightness of 0.75 of a Hefner candle to a square centimeter. The author has examined all forms of illumination. The most dazzling is the Nernst lamp of 460 Hefner candles to the square centimeter. The petroleum lamp is five times the maximal value, and the other sources of light lie between, and should be covered by a globe. The best method of illuminating working places is by reflection from the walls and ceiling of the room. His conclusions are:

(1) All sources of light should be protected by light dispersing globes of such character that the illuminating parts with a greater surface brilliancy than 0.75 candle power to the square centimeter are not perceived by the eye.

(2) That lamp globes should be made of glass which absorbs ultraviolet rays.

(3) They must be so thick and so constructed that they form a closed, dull illuminating surface.

(4) Electric globes with clear walls are not to be used in working places.

(5) Indirect illumination is to be preferred to all other kinds. C. L.

Hypnotism and Suggestion for Eye Patients and the Blind.

LUTHMER, KONRAD (*Wochensch. f. Ther. u. Hygiene d. Auges*, October 3, 1907, Vol. xi, 1, p. 5), attempts to solve the two questions:

(1) Can an eye patient or a blind man be hypnotized as easily as one with normal sight?

(2) Can a blind man hypnotize another blind man or one who sees?

He answers both in the affirmative on the basis of his own experience as a blind man who had never hypnotized anyone before he became blind, but had since. It was, however, more difficult for him to do so, than for a normally seeing person, as confidence in him was not as great. He quotes several cases, one of a person born blind who could only perceive the shadow of the hand. * When hypnotized he could count figures at a distance of 20 to 40 cm. He could count the twigs on a tree and could describe the colors of flowers, although as a congenitally blind person, he could form no judgment of color. Similar results were obtained from other patients. C. L.

The Diagnosis and Therapy of Arteriosclerosis. . .

MINKOWSKI, Greifswald (Abst. in *Wochenschr. f. Ther. u. Hygiene des Auges*, Oct. 10, 1907, Vol. xi, 2, p. 10). Minkowski states that there is no medical treatment for arteriosclerosis as such. Potassium iodide probably acts by lowering the viscosity of the blood, thus allowing it to pass better through the arteries. Whatever the reason, it acts better than another drug, and should be given in doses of 0.2-0.5 gm. three times daily, and should be continued for a long time, even years. When the heart is affected, remedies directed toward that should be employed. C. L.

Extensive Lavage According to Kalt, in the Treatment of Blenorrhea Adultorum.

DAVIDS, Goettingen (*Klin. Monatsbl. f. Augenheilk.*, Aug., Sept., 1907; Abst. in *Wochensch. f. Therapie u. Hygiene d. Auges*, Oct. 10, 1907, Vol. xi, 2, p. 10). The treatment of gonorrheal ophthalmia by lavage with 2 liters of potassium permanganate solution 3 to 2 times a day has been used in the Goettingen clinic since 1898, and has produced the good results claimed by Kalt. The strength used was 1:15,000, instead of 1:5000, as used by Kalt. The severe suppuration had ceased by the end of the third day and all secretion had ceased in 8 to 14 days. The influence on the corneal disease was good, and the opacities were always less dense or absent. There was no pain. C. L.

Conjunctivitis Catarrhalis.

LEVI, Stuttgart (*Med. Korresp.-Blatt*, 1907, No. 35; Abst. in *Wochensch. f. Therapie u. Hygiene d. Auges*, Oct. 10, 1907, Vol. xi, 2, p. 11). Levi believes that silver nitrate is still the sovereign remedy in blenorrhea, in spite of the repeated recommendation of the organic silver salts. In addition, there must be the most careful cleansing of the eyes, the fluids used being practically of equal importance. His conclusions are:

(1) The diagnosis conjunctivitis must be confined to those cases in which objective symptoms are present.

(2) In addition to inspection, microscopic examination should be made of the secretion, when present.

(3) The fundamental basis of many cases of chronic conjunctivitis, even when there are pathologic findings, is refractive errors, especially astigmatism.

(4) Effective therapy follows only microscopic examination of the secretion and correction of the errors of refraction.

C. L.

Blindness Following Tonsillitis Phlegmonosa and Thrombosis Cerebralis.

SEGGER, Munich (*Klin. Monatsbl. f. Augenheilk.*, Aug.-Sept., 1907; Abst. in *Wochensch. f. Ther. u. Hygiene d. Auges*, Oct. 10, 1907, Vol. xi, 2, p. 12). Segger reports this rare condition. The patient had repeated attacks of tonsillitis phlegmonosa dextra, with headaches, chills and vomiting. This was followed by a right-sided exophthalmus, swelling of the lids and chemosis of the conjunctiva. Almost simultaneously, blindness and rigidity of the pupil appeared, quickly followed by involvement of the other eye, although there was no exophthalmus of the latter. Two days later there was a hard mass along the course of the right vena jugularis interna. On the 36th day the lungs were affected. The author makes the following diagnosis: The purulent inflammation of the right tonsil was followed by a thrombophlebitis of the vena jugularis interna dextra by way of the vena palatina. From here the thrombus extended into the sinus petrosus inferior, thence to sinus cavernosus dexter, and the venae ophthalmicae, causing an exophthalmus on the right side by stasis of the blood in the region drained by the vena ophthalmica cerebralis. From the

sinus cavernosus of the right side, the thrombus formation extended into that of the left side via the sinus circulosus Ridley, but did not affect the vena ophthalmica cerebialis sinistra. It was probably not complete on this side, as the blindness was not permanently complete, and there was no exophthalmus. C. L.

Astigmatism Among Soldiers, With Remarks on the Relation of Astigmatism to Myopia.

SEEFELDER (Abst. in *Wochensch. f. Ther. u. Hygiene d. Auges*, Oct. 10, 1907, Vol. xi, 2, p. 15). Seefelder gives a table showing the frequency, kind and amount of astigmatism in the garrison at Leipsic. It was very frequent but rarely reached the extreme of 14.0 D. He agrees with Siegrist that all beginning school children should have their eyes examined and all causes of poor vision corrected. C. L.

Extirpation of the Ganglion Gasseri and Keratitis Neuro-paralytica in Man.

WEISS, JR. (*Klin. Monatsbl. f. Augenheilk.*, Abst. in *Wochensch. f. Therapie u. Hygiene d. Auges*, Oct. 17, 1907, Vol. xi, 3, p. 17). Weiss reports a case of removal of the Gasserian ganglion where the cornea remained unaffected for 4 years. From this and similar cases, the danger to the eye does not seem to be so great, though some authors insist that keratitis neuroparalytica frequently supervenes. C. L.

Gunshot Wound of the Orbit—Removal of the Bullet with Retention of Vision by Kroenlein's Operation.

ZIMMERMAN, Goerlitz (*Klin. Monatsbl. f. Augenheilk.*, Abst. in *Wochensch. f. Therapie u. Hygiene d. Auges*, Oct. 17, 1907, Vol. xi, 3, p. 18). There were small hemorrhages in the retina but insufficient to account for the great loss of sight, which was considered due to a pressure of the foreign body on the optic nerve. Apart from a slight abridgement of the motility of the rectus internus sinister, restitutio ad integrum was accomplished. C. L.

The Treatment of Septic Thrombosis of the Sinus Cavernosus, of Orbital Origin.

STOEWER, Witten (*Klin. Monatsbl. f. Augenheilk.*, Aug.-Sept., 1907; Abst. in *Wochensch. f. Ther. u. Hyg. d. Auges*,

Oct. 17, 1907, Vol. xi, 3, p. 19). Stoewer advises attention to such conditions as furuncles and erysipelas of the skin and affection of the nasal sinuses in treating orbital inflammations. Treatment of these may prevent or check the orbital condition, and is necessary for its complete cure. Extension of the orbital condition to the cavernous sinus is fortunately very rare. The diagnosis is made from the general symptoms, such as fever, delirium, etc., and the local conditions, as shown in ptosis, edema, exophthalmus, rigidity of the pupil, etc. Stoewer advises, after the diagnosis has been carefully made, that the large orbital veins, especially the vena orbitalis superior, be opened up to a considerable distance, and an attempt made to remove the pus from the cavernous sinus by means of aspirating instruments. C. L.

Tetanus Following an Injury to the Eyeball.

MAYWEG, Zuerich (*Klin. Monatsbl. f. Augenheilk.*, Aug.-Sept., 1907; Abst. in *Wochensch. f. Ther. u. Hyg. d. Auges*, Oct. 17, 1907, Vol. xi, 3, p. 20). The infection came rather from the orbital wound. The first symptom was almost complete paralysis of the oculomotorius of the other eye. The patient died in spite of the use of antitetanus serum intravenously and by lumbar puncture. C. L.

Disease of the Eye in Old Age.

MERZ, A. v. (*Russikij Wratsch*, 1907, No. 27. Author's abstract in *Wochensch. f. Ther. u. Hyg. d. Auges*, Oct. 17, 1907, Vol. xi, 3, p. 22), reports the eye diseases found in the Municipal Asylum for Old People, at St. Petersburg, from 1900 to 1904. The 2423 patients were divided as follows:

Conjunctiva and lids.....	599	23.7 per cent.
Cornea	166	6.7 per cent.
Uveal tract.....	52	2.3 per cent.
Retina and optic nerve.....	47	1.7 per cent.
Lacrimal organs	45	1.6 per cent.
Lens	280	10.5 per cent.
Glaucoma	144	5.9 per cent.
Refraction cases.....	1022	44.2 per cent.
Other diseases.....	68	2.8 per cent.

Of the 140 who were blind, glaucoma claimed 46, cataracta

senilis 26 and atrophía nervi optici 19, other causes ranging from 14 to 1.
C. L.

The Pathology and Therapy of the Simpler Forms of Chronic Conjunctivitis.

PETERS (*Zeitschrift f. Augenheilkunde*, Vol. xviii, No. 5, November, 1907). At first glance nothing is easier than the treatment of chronic conjunctivitis, and in many cases the zinc sulphate solution prescribed by the physician usually is effective. Some forms of chronic conjunctivitis are very resistant to treatment, and often are ignored by the busy operator.

The examination of the secretion is very important, not only for its bacteriologic findings, but also because of the diagnostic significance of its morphological constituents. For instance, the early diagnosis of spring catarrh, is possible by the characteristic eosinophile granules in the leucocytes and epithelium.

An enormous increase in the polynuclear leucocytes shows that there is present an additional superficial lesion, or an acute infection. The secretion of chronic conjunctivitis is rich on oil-like droplets, and brown-yellow scales. These concretions are doubtless in the mucous membrane and are identical with the hyaline masses seen in pinguecula and old corneal opacities.

The causes of chronic catarrhal conjunctivitis are grouped into three varieties, bacteriologic, traumatic, and irritations from the blood circulation. In the therapy of the diplobacillus, the author uses a zinc sulphate solution. In cases of failure, he uses a salve consisting of:

Ammon Ichthyol.....	0.15
Zinc Oxide.....	5.
Vaselin Alb.....	15.

In involvement of the lid, he adds amyllum tritic. 3.0 in order to make the salve of the consistency of paste. This salve should be made with great care and much trituration. In pneumococcic infection, he employs compresses of iodine trichloride, 1 to 2500, or the above salve.

The congestion of the conjunctiva and marginal blepharitis often associated with refractive errors, the author believes, are more often the cause of asthenopic symptoms than they are the effect of the refractive errors, as believed by American ophthalmologists.

In the third group, the author arranges the cases of conjunctivitis associated with measles, scarlet fever, influenza, posterior urethritis, etc.

In all cases of conjunctivitis, he uses nitrate of silver or copper sulphate for its caustic action. After the secretion has diminished he uses the above ointment with excellent effect. The ointment is applied once daily, accompanied by massage of the eye for one-half minute.

Asthenopic symptoms are usually relieved by the administration of ergot, quinine, iron sulphate and extract of gentian. In some cases a better effect is obtained from tinct. eucalypt. glob., 1/2 to 1 dram after meals in a glass of water.

If, after several days, the burning sensations or feeling of a foreign body in the eye continues, he scrapes the conjunctiva thoroughly under cocaine, repeating the procedure if required.

F. K.

The Influence of Anomalies of Refraction Upon the Distinguishing of Colors, Especially Upon the Judgment of Spectral Equations.

KOELLNER (*Zeitschrift f. Augenheilkunde*, Vol. xviii, No. 5, November, 1907). To study the relationship between decreased vision and the ability to distinguish colors and spectral illuminations, the author investigated the effect of poor vision upon the ability to distinguish color, etc., by artificially inducing ametropia upon himself and in a case of aphakia in an intelligent person.

He presents his results in a series of tables. He concludes that, ordinarily, the state of the refraction can be ignored in testing colors, but the central vision should be at least 1-20 of normal.

F. K.

The Etiology of Central Hole Formation.

TWIETMEYER (*Zeitschr. f. Augenheilk.*, Vol. xviii, No. 5, November, 1907). Twietmeyer reports three additional cases which occurred in the service of the eye clinic of the University at Greifswald. They occurred in workingmen who had been subject to a severe contusion of the eye, complicated in one case with a perforating wound of the cornea without injury to the lens. He believes that in every case the hole formation was

due to the contusion of the eyeball, and not to direct injury. In the first case reported, a central scotoma was manifest for white and colors, though no evidence of hole formation was seen. Gradually the retina became hazy in the region of the macula after the inflammatory symptoms and venous stasis had disappeared. When seen some months later, hole formation was complete.

In the second case, the hole formation was evident 10 days after the accident though not complete until 4 weeks later. In the third case, the hole formation was seen 14 days after the accident and completed 3 weeks later.

In every case there was an increase in vision from the time of the accident, as the surrounding haze of the retina was lessened.

F. K.

Transference of Experimental Syphilis of the Rabbit Eye from Animal to Animal.

TOMASCZEWSKI (*Muench. med. Wochenschr.*, May 21, 1907, No. 20). Inoculations were made with fresh, evenly eroded primary lesions known to contain spirochetæ pallidæ into corneal pockets and into the anterior chamber of rabbits. Following a period of incubation varying from 6 to 8 weeks, the cornea near the limbus unusually became infiltrated by a more or less dense, slightly elevated opacity, traversed by fine vessels. This infiltration progressed towards the center of the cornea, but in most cases after a variable length of time entirely disappeared.

Histological examination revealed a round cell infiltration chiefly about the new formed vessels. Spirochetæ were nearly always found in the tissue. He was able to inoculate portions of the pannus-like tissue containing spirochetæ through several generations. Such successive inoculations were productive of the same clinical and histological manifestations.

Bertarelli was the first to observe parenchymatous keratitis in the rabbit, and successfully inoculated three monkeys with a pannus of the fifth generation. The syphilitic nature of this affection therefore can hardly be questioned.

The author frequently found iritis 2 to 3 weeks after inoculation. Spirochetæ, however, were never found, and intraocular inoculations of iris tissue gave negative results. Yet, analysis of all such experimental iris affections indicates

a syphilitic process, the iris papules described by Greeff, Clausen and von Schucht being particularly suggestive.

A C. S.

The Treatment of Detachment of the Retina.

DEUTSCHMANN, R. (*Muench. med. Wochenschr.*, March 19, 1907, No. 12). Sixty-seven per cent. of cases were found by the author complicated with myopia; 61 per cent. by Uththoff. According to the latter's statistics, the liability to detachment of the retina increases with the degree of myopia, while Deutschmann finds almost as many cases among the lower grades of myopia. Double-sided myopic detachments were remarked by the writer in 21.8 per cent., by Uththoff in 6 per cent. of cases.

The Expectant Treatment. Contrary to Uththoff, he doubts the efficiency of diaphoretics and considers their general depressant action harmful. He agrees with him that in fresh cases the erect posture is the more desirable, in fact, he even allows his patients to be up and about. By occasional subconjunctival injections of hetol or normal salt solution, he strives to stimulate the secretion of the ciliary vessels so as to increase intraocular tension. Such methods secure the best results for future operative intervention, the subretinal fluid gravitates and the upper retinal tears gradually close.

The Operative Treatment. For the past 14 years the writer has relied on two self-devised operative procedures which he considers superior to all others. They comprise:

A—Counterpuncture.

B—Intrabulbar injections of animal vitreous.

The first is performed only after the fluid has gravitated. A double edged linear knife is introduced below, tangential to the outer lower quadrant, and is passed through the site of detachment to a point in line on the sclera exactly opposite, the second puncture including the sclera but not the conjunctiva.

As the knife is withdrawn, it is slowly rotated to facilitate escape of the subretinal and preretinal fluid. The success of the operation depends on the withdrawal of fluid and the formation of adhesions between chorioid and retina at the points of incision. The vitreous is not encroached upon; the procedure

is harmless. As a rule, reattachment only follows after repeated punctures.

Should this method prove ineffectual and the eye is slowly going from bad to worse, he performs his second operation. The subretinal exudate is tapped and sterile calf vitreous is injected. As only slight inflammatory reaction is desired, weak solutions should be used at the start. If, however, several injections are necessary, the concentration may be increased each time. He does not believe the occasional deleterious effect of these injections on the lens substance a serious objection.

In 442 cases of retinal detachment, Uthoff reports 36 (8.5 per cent.) cures; 18 spontaneous, 10 by conservative, 8 by operative means. In 400 cases Deutschmann observed 57 (14.2 per cent.) cures; 3 spontaneous, 2 by conservative, 52 by operative treatment.

Clinically, Uthoff treated 85 eyes, 65 of which were operative cases; the latter resulted in 6.1 per cent. cures. Deutschmann's operative treatment of 210 eyes (doubtful cases are excluded) resulted in 52 (24.7 per cent.) recoveries.

A. C. S.

The Examination of Reflex Vestibular and Reflex Optical Movements and Their Significance Relative to the Topical Diagnosis of Ocular Muscle Palsies

BARANY (*Muench. med. Wochenschr.*, May 28, 1907, No. 22). Although reflex, vestibular ocular movements were described in 1825, not until quite recently has the subject of reflex ocular movements been studied in connection with the diagnosis of ocular muscle palsies.

Wernicke, Oppenheim, Roth and Bielschowsky, have given the subject special consideration. Absence of voluntary motility in association with ocular movements elicited by head rotation was discovered by both Roth and Bielschowsky. The latter ascribed the involuntary movements to semicircular canal irritation and the whole phenomenon to a supranuclear lesion. He did not examine for vestibular and optical nystagmus. For a detailed description of his methods for testing vestibular nystagmus, etc., Barany refers to his article "Untersuchungen über den vom Vestibular-Apparat des Ohres reflectorisch ausgelösten rhythmischen Nystagmus und seine Begleiterscheinungen." (*Monatsch. f. Ohrenheilk.*, May, 1906, and O. Coblentz, Berlin, 1906).

He produces vestibular nystagmus by turning the patient repeatedly to either side or by syringing the ear with hot or cold water, a useful method when the patient is unable to assume the erect posture.

The nystagmus produced by cold water is directed towards the opposite side and consists of a rotary and horizontal, a rapid and a slow component, the latter being probably of vestibular origin. The slow movement is studied in its relation to the conjugate palsy.

In the rare cases of paralysis of associated vertical movements, rotation may be tried and with a certain amount of reservation aural syringing. He induces optical nystagmus by rotating before the patient a black striped cylinder. He reports a case the important symptoms of which were (1) complete lateral conjugate paralysis followed later by additional paralysis of vertical voluntary movements; (2) almost complete horizontal reflex motility with vertical vestibular reflex motility; (3) absence of vestibular nystagmus, instead deviation (*déviée*) because of vestibular irritation; (4) absence of optical nystagmus during fixation of moving objects (black striped cylinder); (5) inability to follow slowly moving object of fixation.

Intact vestibular motility pointed to a supranuclear palsy. Wernicke and Oppenheim have shown that lesions between cortex and visual center destroy voluntary lateral motility; the ability to follow a slowly moving object in the horizontal plane however remains. Absence of spontaneous, vestibular and optical nystagmus indicated a lesion in the visual center itself or in the fiber bundles between that center and the primary ocular muscle nuclei. Postmortem examination in fact revealed a luetic infiltration of the corpora quadrigemina and pons.

The ocular symptomatology of cerebral pseudobulbar paralysis may present similar conditions; voluntary control may be abolished and yet the ability to follow an object remain. Spontaneous nystagmus is, however, present (Oppenheim, Wernicke, Bielschowsky) and probably also vestibular and optical nystagmus.

A. C. S.

On the Comparative Physiology of the Eye.

(PART I.)

RAEHLMANN (*Die ophth. Klinik*, No. 9, May 13, 1907). He compares the composite eye of the arthropode with the verte-

brate eye. In the former isolation of each visual compartment during light exposure is affected by a phototropic pigment. The images are not well defined but possess marked light intensity. By reason of diffusion circles covering a number of elements, such eyes are not well adapted for the recognition of still objects, but excel in the perception of moving bodies.

In the human eye similar isolation of each retinal element occurs, suggesting functional independence of every visual cell. The macula and area centralis of the higher vertebrates represent regions of high visual acuity, the cones being situated in line with the visual axis, the inner surface of the external segments forming a plane surface (Vide *Ophth. Klinik*, 1906, No. 19). Each cone independently contributes to color, form and light perception.

The function of the periphery of the human retina in many respects resembles that of the undifferentiated retina of the arthropode. Vision is single, i. e., the cells do not co-operate, visual acuity is low, accommodation plays no part, perception of light and moving objects, however, is well developed. Low visual acuity in the human retina peripherally is attributable to the fact that the inner surfaces of the rods and cones here do not form a plane surface. No sharp images can therefore be received, accommodation is without effect.

The easy recognition of moving objects he ascribes to the motion communicated to the diffusion circles by any change of position of an object in the field of vision. The diffusion circles extending over many cells, thus augment the perception of motility.

An anatomical explanation of the increased sensitiveness to light may be that in the periphery several retinal elements are joined to a neuron of a bipolar cell, producing concentration of light stimulation (Greeff). Oskar Schmidt and Exner have shown that in the faceted eye of many crustaceans and insects the crystalline body is bent on itself, permitting total reflection of light rays. A similar condition Raehlmann believes may also occur in the periphery of the human retina where curved rods and cones are not infrequent. A physical means of light concentration thereby becomes conceivable.

Apparently there is, nevertheless, a decided difference between the vertebrate and invertebrate eye, in the former the sensory layers being directed away from the light, in the lat-

ter towards the light. In the vertebrate, however, reflection of light from the outer segments reverses the light waves in the direction of the nerve paths, the rods and cones becoming after all the direct recipients of the light stimulus, an arrangement which is common to the animal kingdom. A. C. S.

(PART II.)

RAEHLMANN (*Die opth. Klinik*, May 20, 1907, No. 10). Close observation of the habits of insects leads one to attribute to them a certain degree of color sensibility. To arrive at a physiological explanation of color perception in insects, he first describes the anatomical features of their visual perceptive organs. He compares the striated appearance of the rhabdoms (rods) with the striations produced by the superposed disks in the rods and cones of the vertebrates. In the rhabdoms these, too, are attributable to a series of superposed disks, which, however, are of alternating high and low refracting powers. The effect on the light waves is perhaps the same as that offered by a series of thin glass plates separated by thin layers of air. The rays after emergence reach the visual cell in a definite phase of motion, and their maximal and minimal undulations are situated within the protoplasm at definite intervals.

Insects with rhabdoms constructed after this plan could, however, only perceive colored light impressions. Vision would resemble the impression we receive on looking through a colored glass. Certain objects (colored the same as the glass) by virtue of their light intensity would appear especially striking. The insect (butterfly, etc.) is attracted by such objects thus explaining the selection of particular colored resting places, etc. Differences in the arrangement of the discs induce different species to favor different colors.

Inasmuch as only that portion of the light concerns vision which has traversed the disks of the rhabdom and which consequently is weakened by repeated reflections, the illumination to make vision possible must be intense.

Efficient orientation would therefore only be possible in direct sunlight. (It is well known that diurnal butterflies only appear in sunshine.) While color perception of insects can not be identical with that of the vertebrate eye, chiefly because of anatomical differences, we may certainly conclude that

they are able to appreciate color difference. Whether by actual perceptive qualities or by perception of chromatic gradations of one and the same kind of light, is as yet uncertain, although the latter possibility in view of the foregoing, seems to be the more probable. A. C. S.

A Gunshot Wound Along the Orbital Contour.

BERGMEISTER (*Wiener klin. Wochenschr.*, May 2, 1907, No. 18). The patient, a male aged 24 years, accidentally shot himself with a revolver in the left frontal region. A small slit-like wound of entrance was situated about $\frac{3}{4}$ cm. above the left eyebrow; the projectile could be palpated through the outer portion of the lower lid. On separating the lids, a lacerated wound of the bulbar conjunctiva about 15 mm. temporally from the limbus presented itself, and the wound extended well into the fornix. In the lowermost wound angle partly under the conjunctiva was situated the projectile.

There was hyphema and discoloration of the iris. No reflex was obtainable. Tension normal. The projectile was excised and after the acute symptoms of contusion had subsided, vision improved to counting fingers at 1 meter. Vitreous opacities were still present.

The projectile resembled a hollow cylinder, the tip of which was indented and the edges everted. Externally it was traversed longitudinally by a broad, slightly spiral groove bounded by sharp margins. In this case, as sometimes happens, the lead covering had become separated from the body of the projectile.

The writer then proceeds to discuss in a general way the factors involved in the production of such wounds. In this case the separation of the lead capsule no doubt favored penetration of only the soft parts. The heat generated at the site of impact combined with the momentum to induce distortion of the projectile, the tip not only being depressed but after deflection the impression of the upper outer orbital rim being transferred to the missile, the rotary motion of which caused the impress to be somewhat curved.

According to Wahl, as the projectile force of the missile decreases, rotary motion increases which tends to concussion and contusion of the tissues. A. C. S.

Abnormal Laughter of Ocular Origin.

NEUSTAETTER (*Muench. med. Wochenschr.*, June 11, 1907, No. 24). In his introductory remarks Neustaetter refers to two well-known means of inducing reflex laughter as mentioned by Wiesner in his work on the pathology of laughter, (a) by tickling, (b) by ridiculous or humorous presentations.

Neustaetter's observations relate to a variety of reflex laughter in which the etiological factor acts as in the first instance—a form of reflex laughter (usually uncontrollable) provoked by an ophthalmoscopic examination.

He observed 5 such cases in 12 years, three in females, two in males, their ages varying from 8 to 45 years. He was at first inclined to attribute the phenomenon to personal peculiarities, but its occurrence in intelligent, sober-minded individuals lead him to consider it a true reflex symptom. He could find no record of any case in literature, still he is confident that others must have encountered similar cases. Smiling, a larval reflex symptom, occurs much more frequently A. C. S.

Concerning a Successful Treatment of Ocular Tuberculosis With Tuberculin.

ERDMANN (*Muench. med. Wochenschr.*, April 2, 1907, No. 14). The patient was a young woman who had been afflicted with bone tuberculosis since childhood. She came to the author with a mild iridocyclitis. At first the usual treatment was instituted but when the cornea became infiltrated he decided to give the new tuberculin of Koch a trial. He prepared his own solutions, using normal salt solution as a diluent. He began with a dose of .002 mg., increasing .002 mg. at each injection, administered every other day. Constitutional disturbances and local reaction as evidenced by exudation in the anterior chamber and new infiltrations in the cornea followed the injection of .01 mg. Treatment notwithstanding, was continued, but for the time being the dose was diminished and then very gradually again increased.

Three weeks after the first injection the cornea was well vascularized, inflammatory symptoms slowly subsided, vision finally becoming about 1/2. Sixty injections were given in all. The dose never exceeded .8 mg. No other drug except atropine was employed. Erdmann considers of importance (1)

the employment of small initial doses; (2) careful increase in dosage; (3) prolonged course of treatment. A. C. S.

Iridocyclitic Irritation After Vaccination.

MICHAELER (*Die ophth. Klinik*, No. 15, March 5, 1907). The writer briefly refers to a case of irritation of the anterior uveal segment in a patient who had been vaccinated about two weeks before. There was no history of other infections, and no traumatism. The affection was onesided and characterized by conjunctival chemosis, pericorneal injection, contracted pupil, and discoloration of the iris. The media were clear, the eyeball sensitive to touch.

Under dietetic regulations, dark glasses and cataplasms, the symptoms subsided within a week. A. C. S.

Eye Muscle Paralysis After Spinal Anesthesia.

ACH, A. (*Muench. med. Wochenschr.*, March 26, 1907, No. 13). In v. Angerer's clinic four cases of 6th nerve paralysis consecutive to 400 cases of spinal anesthesia were observed. Three followed the injection of stovaine; one of tropacocaine; three were unilateral, one bilateral; the palsies appeared from 4 to 11 days after the operation and lasted from 6 to 43 days. Severe subjective symptoms accompanied the condition.

After reviewing the literature with reference to the different opinions presented as to the causative conditions, he arrives at the conclusion that not sufficient attention has been devoted to the anatomical relations. According to him, the ascent of the injected fluid is attended with difficulties; several narrow passages must be traversed before reaching the base of the brain. Experiments conducted on 18 rabbits showed, provided the animals were kept at rest, that even extreme elevation of the pelvis and moderately large doses of concentrated coloring fluids only in exceptional instances caused invasion of the lower cerebral region. He is therefore convinced that the small doses usually administered allow but small quantities of the drug to reach the brain, and then only very gradually and very much diluted. Besides an early chemical or physical combination with the nerve substance is conceivable.

When nerves do become involved they are usually those of relatively small size, but whose course within the cerebrospinal

fluid is rather prolonged before penetration of the dura, nerves situated in physiological recesses such as the 6th, 4th and 3rd nerves. The toxin thus probably acts directly on the nerves.

He concludes that:

(1) The least harmful anesthetic should be selected, which is tropacocaine. Stovaine acts too powerfully on the motor nerves.

(2) Small doses should be administered.

(3) Concentrated solutions should not be used.

(4) Immediately after the injection, rest in the recumbent posture is essential if possible with the upper extremity elevated; if this is not feasible, elevation should at least be resorted to after the operation.

A. C. S.

ABSTRACTS FROM RUSSIAN OPHTHALMIC LITERATURE.

By A. BARKAN, M. D.,

SAN FRANCISCO, CAL.

Tattooing of Leukoma.

GERMANN (St. Petersburg) dips Von Hippel's corneal trephine into Indian ink, then he marks the pupil to be colored slightly with the trephine. In that way the outline of the pupil becomes sharp and perfectly round. The author praises excellent cosmetic result.

On Isophysostigmin.

NIKANOROW. In a preliminary communication made to St. Petersburg Ophthalmological Society, the author stated that this remedy in 0.1 per cent sol. acts more strongly than eserine 1 per cent. It acts more quickly, and more enduringly than eserine.

Optic Neuritis.

LEZENIUS, St. Petersburg (translated from the German report in the *Klinische Monatsblätter für Augenheilkunde*). The recommendation of the author to give certain cases of optic neuritis hydrotherapeutic treatment, as described in the *Klinische Monatsblätter*, March and April, 1907, is approved by Germann and Blessig. They have watched the cases already communicated by Lezenius in common with him, and confirm its evident therapeutic effect. Blessig considers this treatment, although purely empirical, particularly indicated in those cases where the anamnesis does not afford a distinct clue, and where direct indications of a specific treatment are wanting. Possibly also in certain cases of retrobulbar neuritis, produced by alcohol.

On Radium Treatment of Trachoma.

KARDO-SYSSOJEV, St. Petersburg (translated from the German report in the *Klinische Monatsblätter für Augenheilkunde*). A glass tube in which ten mg. radium were

melted, are used once weekly for from three to ten minutes to one eye only. The other eye was treated in the usual manner. The author could observe the quick disappearance of the follicles, and diminution of the infiltration. Anatomically, one could find a passing away of lymphocytes on excited parts of the conjunctiva.

Influence of Haemolytic Serum on the Eye.

FILATOW, Odessa (translated from the German report in the *Klinische Monatsblätter für Augenheilkunde*), has made an interesting series of experiments on the influence of the normal and immune haemolytic serum upon the eye. His intention was to continue and try the work done in this direction by Prof. Godowin and Prof. Roemer. The conclusion he arrives at was, "it is premature to use injections of normal serum in the eye of man for therapeutic purposes." Second: injections of immune haemolytic serum, according to Roemer are dangerous to the method itself. It does not answer its purpose, for oftentimes the injection is accompanied by strong reaction, and the resorption of red blood corpuscles is not often accelerated.

Tumors of the Optic Nerve.

GODOWIN (translated from the German report in the *Zeitschrift für Augenheilkunde*). Godowin has published the third part of his work on tumors of the optic nerve, and their operative treatment. He proposes to combine in the surgery of the orbit both the operation of Knapp and of Kroenlein. His reasons are: Knapp's operation, which is started through the conjunctiva, does not give sufficiently large entrance between the bulb and the lids in many cases, especially when unexpected accidents occur. He remembers a case of a young girl, which after opening the orbit, a thin walled, pulsating aneurism bulged forward, and where every moment, a rupture of this wall might be expected. By tying immediately, the common carotid, the case was cured. Another disadvantage of Knapp's operation, although appreciated by him for many reasons, is that the entrance passes through the conjunctiva which can never be thoroughly sterilized. Knapp's operation, however, is

easily executed, and whatever modification of the operation one may use, renders oftentimes Kroenlein's operation unnecessary.

Because of these reasons, Godowin proceeds thus: Incisions are made along the upper and lower orbital edge. These meet in the external canthus. From that point Godowin enters into the depth after cutting through the fascia tarso-orbitales. He does not touch the periosteum unless there are indications for its removal. If the operation can thus be carried out he closes the wound and calls it "Orbitomia Simplex." If the entrance is too narrow, Godowin follows Knapp's operation with the Kroenlein. He dilates in most cases an incision, by starting in the external angle, where the two incisions meet (Orbitomea Ossea).

Radium in the Treatment of Follicular Trachoma.

SELENKOWSKY (translated with the use of the German report in the *Zeitschrift für Augenheilkunde*). Selenkowsky publishes the results which he has had in follicular trachoma, using radium. He first studied the effect of radium on the normal rabbit's eye. Thirty mg. of radium used for one-half to one hour directly on the eye was not tolerated. Result, corneal opacity, exudate in the anterior chamber, histologically ascertainable hyperemia of the iris, and degeneration of the retina. Even 10 mg. of radium kept in front of the eye for longer periods were hurtful. Its effect every second or third day for ten minutes had no hurtful influence on the eye, especially if used through the everted lids which covered the eye. His experiments are thoroughly encouraging. His patients (25) except four of them, had distinct follicular trachoma, and had been thoroughly cured. Fourteen of them had been observed for a long time, and remained perfectly well. No scars remained. The radium does not stand behind the usual modes of treatment in efficiency. He advises, before using radium on a patient, to try its effect on platina, on the skin, and on rabbits.

While Selenkowsky tried radium on cases of follicular trachoma which showed no secretion, or other complications, Kardo-Ssyssojew tried the radium effect on complicated trachoma, with secretion, papillary, new formation with scars, and finally cases of pannus. Radium showed ab-

solutely no effect on scars, and on all other complications; especially on papillary trachoma and on pannus, the results are very favorable. The experiments are continued.

Glaucoma.

WIGODSKY (translated from the German report in the *Zeitschrift für Augenheilkunde*). Wigodsky discusses the treatment of glaucoma and gives as his reason that the lack of harmony among oculists in the question of operation is undermining the confidence of the people and is working harm to physicians. He favors in such cases an iridectomy—above all things, as long as we do not possess other operations, and use of miotic remedies.

Adamuck's answer, supported by rich and long experience, is interesting. Adamuck, himself a pupil of Graefe, has been a careful partisan of iridectomy, but abandoned it more or less owing to failures, some of his cases having grown worse. Excision of iris in a clear pupil already produces lessening of visual acuity (questionable argument—the translator). The timely use of medicine was of greater value than Adamuck supposed. He illustrates this with two examples: One was a girl who had been under Adamuck's treatment for seven years. The vision in the right eye kept normal until the death of the patient (20/20). In the patient's left eye an iridectomy had been made formerly; the eye had to be enucleated, because of unbearable pain. The second example with which he supports his opinion is Adamuck himself. Since his thirty-sixth year he has had attacks of glaucoma. He has treated them himself with miotics. His vision has remained normal. He always carries a miotic with him and uses it immediately when prodromal symptoms occur. All this refers to glaucoma with increased tension. Glaucoma without increased tension is not glaucoma, but an affection of the optic nerve with excavation. Adamuck has often seen the occurrence of optic nerve atrophy four or five years after an iridectomy. He has often published this fact without its having become widely known, however.

SOCIETY PROCEEDINGS.

SECTION ON OPHTHALMOLOGY, COLLEGE OF PHYSICIANS OF PHILADELPHIA.

Meeting December 17, 1907. Dr. Howard F. Hansell,
Chairman, presiding.

Microphthalmos with Coloboma of the Optic Nerve.

Dr. G. Oram Ring exhibited a patient showing microphthalmos with coloboma of the optic nerve. The patient aged four years, was one of four children, and the only female. No other congenital abnormalities were present in the family. The cause was presumably the failure in the closure of the cleft found in the lower portion of the optic nerve in early fetal life.

The characteristics of the nerve coloboma were considered in making a differential diagnosis from the sclerorchorioiditis of myopia. In the case exhibited, the excavation in the disk was as usual in the inferior portion. The diameters were increased from above downward; the central vessels were irregularly distributed in two positions near the lower border as well as above. Maximum dilation under mydriatic, 6.5 mm., tension normal, the eye amblyopic and strabismic, but not nystagmic. O. S. was normal in appearance, chorioidal circulation was uncovered, the pupil dilated to a maximum of 8.5 mm. Refraction of defective eye by retinoscope was + 1 sph. \ominus + 4.50 cycl. ax. 90, and that of the normal eye, plus 2.75 sph.

Corneoscleral Growth.

Dr. Ring exhibited a second case showing a small growth on the corneoscleral margin. The patient was a boy, aged thirteen years, first seen two months ago. The family and personal history as bearing on the case were entirely negative. The growth had been noted for two years, and he applied for treatment because it was thought to be increasing in size.

Under magnification the growth was found to be bilobed, that portion extending on to the cornea was vertically quadrate and rather translucent; the inner portion was distinctly pink in hue and somewhat more triangular. It was

about 5 mm. at its base both in vertical and horizontal meridians, and encroached on the cornea at the inner limbus 1.5 mm., the outer edge being vertical. It was elevated about 2 mm. above the surface of the eyeball, and was firmly attached to the cornea, conjunctiva, and underlying structures. The episcleral veins from the inner canthus extending to the growth were unduly filled. There was an opaque arc at the inner margin of the cornea with a transparent area between it and the limbus, very suggestive of the usual senile arc. The iris reaction was prompt, and the media other than noted were clear.

As to the etiology it was thought that by the history and appearance of the growth, both syphilis and tuberculosis could be excluded. Possible irritation from a foreign body resulting in a granuloma was considered. The growth appeared to be benign, but a positive diagnosis could not be made until it was placed under the microscope. The history elicited was considered to exclude in as young a boy, gouty manifestation.

Dr. de Schweinitz called attention to the curious color and gelatinous appearance of the growth. It reminded him very much of two cases which he had seen, one in a woman fifty-seven years old, and the other in a man, forty-nine years old. Both showed the same gelatinous appearance, and encroached on the cornea. In one case it was thought to be malignant and operation was advised, but refused. Both patients were intensely gouty, and rather irregular in their habits of life, so antigout remedies were tried, under which the growths absolutely disappeared, during the course of several months. He thought they represented some form of gouty scleritis, perhaps, but it did not seem probable that the same explanation would hold in Dr. Ring's case.

Dr. Risley said that Dr. Ring had kindly given him the opportunity to study the patient a week ago. At that time the appearance of the growth left him in doubt as to its nature. It was not clear whether it might not be dermoidal in character, but the absence of the density characteristic of such growths reminded him of a mass he had seen developed around the bearded hull of a seed at the upper limbus of the cornea, which rapidly disappeared after removal of

the foreign body. He called attention to the frequent malignancy manifested by these grayish growths at the corneal limbus, after attempts at removal, especially in patients after middle life, and cited a notable instance in the practice of the late Dr. Wm. F. Norris. In this case it recurred after removal and cauterization again and again, and it was found necessary to remove the eyeball.

Foreign Body in the Iris.

Dr. Ring showed also a foreign body in the iris with the following history: The man had been cutting steel wire cable, and was struck in the eye by a minute sliver. The opaque wound of entrance in the cornea could be distinctly outlined, but at the time of his initial visit, which was about two weeks after the accident, the foreign body was imbedded so thoroughly in the iris tissue that it could not be seen; later, however, it was faintly outlined down and in.

The patient declined operation until one month after accident. It was felt that in addition to the use of the magnet, a small iridectomy would probably be required because of the adhesion of the foreign body in the mass of iris exudate.

Dr. Ring said that it was interesting and important to note that the x-ray failed to show the presence of the foreign body presumably because of its small size, and the fact that the edge evidently presented itself to the x-ray plate. This was the second case which had occurred in the hospital work this year in which the x-ray had failed to show the presence of a foreign body. In the case shown, the plate was prepared at the hospital, but in an earlier case the localization was done by Dr. Sweet.

Dr. Sweet said that it was rare for a small metallic body which lacked sufficient density to be shown by the x-rays, to strike the eyeball with force enough to penetrate into the interior of the globe. He had radiographed the case referred to by Dr. Ring, and, although a narrow, thin body could be seen in the upper, inner quadrant of the slightly opaque lens, the plates failed to indicate its presence. The metal presented its thin edge toward the x-ray tube, and it was probable that the faint, linear shadow cast was lost in the denser shadow of the external orbital border.

In connection with the case, Dr. Sweet referred to the

penetration and lodgement of a small piece of a file in the lower portion of the iris of a child, aged ten months. Before opening the anterior chamber, he passed the point of the magnet over the cornea in several directions, and succeeded in disengaging the metal from the iris, so that extraction through an incision in the cornea was successful, and iridectomy was not necessary.

Sclerocorneal Growth.

Dr. S. D. Risley presented for examination a patient with a dermoid growth at the sclerocorneal limbus, complicated with marginal keratitis. The boy gave a history of sudden onset of the trouble, which, together with the inflammatory symptoms present, gave to the dermoid growth the appearance of a granuloma developing around a foreign body. An incision through the mass and careful search failed to discover any foreign substance. The growth was cauterized freely with trichloracetic acid, hot salt stupes were continuously applied, and a subconjunctival salt injection given on alternate days. Under this treatment the dermoid became vascularized and finally disappeared, leaving a gray, flat nebula, corresponding to the base of the growth.

Bilateral Exophthalmos.

Dr. Risley presented also a case of bilateral exophthalmos. The patient was an otherwise healthy colored woman, aged forty years, first seen three weeks before at the Wills Hospital. She complained of headache, and showed proptosis of both eyes directly forward, the protrusion being most marked on the left side. The lower fornix in both eyes was forced forward into a large roll of edematous and infiltrated conjunctiva, preventing closure of the lower eyelids. There was no pulsation or bruit, no evidence of Graves' disease, and no palpable growth in the orbit. The patient denied syphilis. A skiagraph by Dr. Sweet, and subsequent electric illumination excluded disease of the frontal and maxillary sinuses, as causal factors, and ill-defined shadows in the posterior ethmoidal and sphenoidal region were of doubtful significance. After a week, under ascending doses of potassium iodide and mercurial inunctions, the pain

ceased, the proptosis diminished, and the mobility of the balls improved. Dr. Risley pointed out that while disease of the ethmoidal cells was not positively excluded, the proptosis was quite obviously due to some obstruction to the intake of blood from the ophthalmic vein, probably in the region of the cavernous sinus, not occluding absolutely the flow through this sinus, but retarding it. The improvement in the proptosis if continued under the mixed treatment he thought would favor the opinion that the obstruction was due to a gumma or node in the region of the cavernous sinus, notwithstanding his inability to discern any positive syphilitic history.

Dr. Holloway, referring to the fact that the proptosis was directly forward, said that Van Duyse had reported a case, in which the exophthalmos was due to a fibrosarcoma springing from the ethmoidal cells.

Dr. Harlan thought that the lesion might be situated in the sphenoidal sinus. The absence of pulsation would probably exclude serious trouble in the cavernous sinus. If the sphenoid was involved, the examination of the visual field might prove of importance.

Dr. Risley, in closing, said that interpretation of skiagraphs of the skull in the colored race was difficult on account of the thickness of the bony walls. Disease of the sphenoid and ethmoid could not be excluded, but he was more inclined to the diagnosis of gumma.

Bilateral Cicatricial Ectropion of the Upper Lids in a Patient with Extensive Lupus, Corrected with Skin Flaps Taken from the Arm.

Dr. G. E. de Schweinitz demonstrated a patient with an extensively scarred face as the result of lupus, whose ectropion had been successfully relieved by skin grafts taken from the arm and sewed into place after the everted lids had been freed from their cicatricial connections and placed into normal position. On the left side the graft was 3.5 cm. long and 2.5 cm. wide, and became attached by first intention, without the slightest sloughing of any kind. On the right side the graft was 3 cm. long and 2 cm. wide, and also became firmly united except for a narrow strip at the inner end which became necrotic, but which did not materially vitiate the effects of the operation.

The interest in the case resided in the size of the flaps, which had so successfully gained union when surrounded by a tissue as badly scarred and diseased as that which the patient's face and forehead presented.

Epithelioma of the Inner Angle of the Eye Cured by X-Rays.

Dr. de Schweinitz also presented a patient, who, for a number of years, had been afflicted with a slowly growing epithelioma occupying the inner end of both lids upon the left side, as well as the adjacent nasal tissue, and which had sprung forward in somewhat knob-like protuberances. The entire growth was dissected from its bed, leaving a raw surface, which penetrated into the lids and side of the nose, but had not destroyed them. After this operation Dr. Pancoast applied the x-rays, and after the tenth treatment, the application being made on alternate days, there was smooth, firm cicatrization and no malposition of the lids.

Dr. de Schweinitz referred to the interest which attached to the rapidity of the cure, as well as the importance in these cases of removing as much as possible of the growth and sacrificing as little as possible of the tissue from which it originated, thus giving the rays a chance to exercise their curing qualities in a much shorter space of time than if the greater mass of the growth had not been removed with the knife.

Dr. Harlan said the first case shown by Dr. de Schweinitz was an unusually successful Wolfe transplantation. With the skin of the face in the condition that it was in this patient, this was the best that could be done, as no flap could be taken from the neighboring parts. The final result, some years later, of the Wolfe operation was not likely to be so good as the immediate one, on account of the tendency of the flap without pedicle to contract excessively, or even to disappear by absorption. Dr. Fryer has reported a case in which there was little or no retraction in eighteen months, but six years after the operation the flap had contracted to less than a third of its original size, and the ectropion was reproduced. Cases have been reported, however, in which the result remained satisfactory for comparatively long periods.

Dr. Harlan's own preference was for the sliding flap of Dieffenbach, particularly in ectropion of the lower lid, when the conditions of the case made it practicable. A defect in the operation was that the bared space left to granulate was below the canthus and the latter was dragged down by the cicatricial contraction. He had endeavored to avoid this by filling the bared space with another flap taken from the temple, and cases operated upon by Dr. Norris and himself had resulted very satisfactorily. Photographs of the patients were shown.

Keratoconus. Report of an Unusual Case.

Dr. C. W. Le Fever (by invitation) showed a case of keratoconus in a man, aged forty-six years. His history was negative except for an attack of rheumatism six years before, he had used alcohol to excess for twenty years, but not within the past six years. There had been no previous ocular inflammation. Glasses were not worn until he was thirty years old. Records of changes made in the lenses during the past eight years showed a rapid increase in the astigmatism, until at present best vision was obtained in the right eye with -4 sph. \ominus -12 cyl. axis 75 degrees $= 20/40$; in the left with $+2$ sph. \ominus -12 cyl. axis 100 degrees $\ominus 20/40$. For reading he required a $+3.50$ sph., which he used in a separate glass, placed on the tip of his nose in a horizontal position; with this he could read type 0.75 m. at ten inches. The apex of the cone was clear. It occupied an unusually low position on the cornea, and resembled very much a hanging drop of some viscid fluid. The great thinning of the tissues was evident by the ease with which the cone could be indented with the oiled finger. Dr. Le Fever thought the low position was perhaps due to the fact that this was the middle of the palpebral fissure, and therefore, had least support from the lids. He had thought at first that the horizontal position in which the reading lenses were held was for prismatic effect, but the same results could not be obtained with prisms. In addition to the careful correction of the refractive error, a miotic was constantly employed.

Dr. Thorington said that patients with keratoconus had a faculty of being able to improve their vision by looking

through almost any strong cylindrical lens, if allowed to tilt it at some unusual angle; this was easily accounted for by the character of the conus, which was usually an oblique one. Personally, he got most satisfaction in trying lenses for keratoconus when he employed a cycloplegic, and used the retinoscope and the stenopeic slit. In regard to the etiology of the condition, he wishes to put on record the observation that in four cases out of five seen by him recently there was a history of hay fever. Dr. Le Fever's case was one of these, although the element of hay fever had not been mentioned in the history. One case in private practice had been examined in May for color blindness, the eyes being then otherwise normal. Six months later he returned after a severe attack of hay fever, and vision was found to be very defective owing to a typical keratoconus, which had developed during the attack.

Dr. Turner suggested that a still stronger reading glass might give better results.

Dr. Hansell thought at first that the advantage of the horizontal position of the reading glass was prismatic, but further consideration convinced him that the power of reading thus secured, was due to the cylindrical effect of the tilted spherical glass. The patient wore for distance — 12.00 cyl. axis 90 degrees. For near + 3.50 sph. By his peculiar manner of wearing this near glass he materially increased the correction for astigmatism adding a convex cylinder axis 180 degrees.

**Iridocyclitis; Anterior Chorioiditis and Total Detachment
of the Retina in a Case of Cerebrospinal Meningitis;
Histological Examination of the
Enucleated Eyeball.**

Dr. G. E. de Schweinitz and Dr. C. M. Hosmer (by invitation) described the microscopic appearances of an eyeball which clinically presented the symptoms of iridocyclitis and a yellowish mass in the vitreous removed from a child, aged ten years, who had passed through a severe attack of cerebrospinal meningitis, the ocular lesions having been noted as early as the fifth day of the disease. They found marked iridocyclitis and cyclitic membrane formation, moderate anterior chorioiditis, with edema of the posterior portion of

the chorioid, total detachment of the retina covered by a mass of fibrocoagulate, and distinct infiltration of the parenchyma of the cornea, with lymphocytes and leukocytes, as well as penetration of its layers by numerous bloodvessels. Cultures taken from the eye immediately after its removal had failed to demonstrate the presence of any micro-organisms. Examination of the fluid obtained by lumbar puncture made during the child's illness revealed the presence of the meningococcus.

Dr. Chance said that in an examination of forty cases of cerebrospinal meningitis he had found no case of uveitis. Dilation of the retinal veins was constantly present, but he had not observed the discoloration in them which was recorded by Randolph. He had seen in a number of cases which had recovered, a plastic exudate from uveitis, but none among the number examined in the hospital during the acute illness.

Dr. Hansell said that during the epidemic of cerebrospinal meningitis three or four years ago, he had examined several children in the Philadelphia Hospital, and found no eye complications other than venous hyperemia of the retina.

Dr. de Schweinitz said that Heine had reported many cases of vitreous opacities, and Randolph had seen thromboses of the retinal veins. He thought the differences in findings must be due to a variation in the severity of the epidemics, owing, probably, to a difference in the virulence of the micro-organisms.

Recurrent Vitreous Hemorrhages in Adolescence.

Dr. Frederick Krauss reported a case of recurrent hemorrhages into the vitreous occurring in adolescence. (Published in full, page 58).

A Case of Acute Double Miliary Tuberculosis of the Conjunctiva.

Dr. Howard F. Hansell presented a Lithuanian, aged thirty-seven years, who stated that he had been healthy all his life and had no trouble with his eyes until nine weeks ago. The skin of both upper lids was discolored, and the lids were swollen and drooping. Scattered over the conjunctiva of both upper and lower lids were numerous yel-

low, isolated swellings. They were round or oval, the size of a grain of wheat, circumscribed and sharply separated from the adjacent membrane, yellow in color, as though they contained pus, slightly raised above the surface of the membrane and covered by epithelium. Material obtained by scraping the conjunctiva was examined microscopically, and found to contain numerous tubercle bacilli. No signs of general tuberculosis could be detected. The pre-auricular and cervical glands were not enlarged. The eye-grounds were healthy. V. = 6/6, with — .75 sph.

A positive opinion as to the value of diagnosis and treatment by tuberculin could not at this time be given, but he believed both to be of great service. Calmette's suggestion of applying the tuberculin directly to the conjunctival sac and then determining by the reaction the presence of tuberculosis was not, in his limited experience, dependable. It was tried in the above case with negative result; also in fifteen or twenty individuals known to be suffering with general tuberculosis the reaction was present in only one-fourth.

Dr. Zentmayer stated that he had seen this case on one occasion, about six weeks ago. The picture it presented was striking and, to him, unfamiliar. Owing to the fact that on massaging the lids fine vermicular jets of a yellowish-white sebaceous matter exuded from the mouths of the Meibomian glands he had supposed the lesion to be in the glands.

Regarding the value of the ophthalmotuberculin test Dr. Zentmayer called attention to a recent communication by Schiele in which it was stated that to insure an errorless conclusion as to the existence of a tuberculous focus elsewhere in the organism, follicular disease of the conjunctiva and trachoma must be excluded, because in their presence a reaction which may cause serious complications occurs. Schiele believes that the fact that in these two affections a local reaction is obtained supports his previous contention that these affections are related.

Dr. de Schweinitz said that the final test in the diagnosis would be the inoculation of some of the tissue into the eye of a rabbit, and he hoped the method would be tried by Dr. Hansell.

Dr. Hansell said in closing that the report was only a pre-

liminary one, and that a rabbit's eye would be inoculated. He expected to try the effect of tuberculin injections in treating the patient.

A Rare Form of Complicate Cataract.

Dr. Zentmayer presented a paper on A Rare Form of Complicate Cataract and presented one of the patients. The cases occurred in a brother and sister, aged respectively twenty-five and twenty-three years. They presented the following characteristics Corneae unusually large, very deep anterior chambers; irides tremulous; the large and small circles sharply differentiated, the larger being blue, the smaller brown; the structure of the iris appeared atrophic, the stroma consisting of converging straight lines entirely wanting in pattern; sclera bluish white porcelain-like; lenses milky white. Three of the lenses were discissioned, and in two instances, but one operation was required, the lens matter being fluid and flowing at once into the anterior chamber. The operations were followed by high tension requiring paracentesis for its relief. The ultimate vision was good in all instances. A first and a second cousin of the patient's mother had (senile?) cataract. With the exception of the absence of ectropion urvae, and the fact that operative results had been good, the cases were precisely like those recently reported by Purtscher, under the title "A Little Known Form of Complicate Cataract."

Meeting January 16, 1908. Dr. Howard F. Hansell, Chairman, presiding.

Dr. G. Oram Ring exhibited a patient showing extensive splotches of xanthelasma on each upper and lower eyelid. Typical chamois colored areas of degeneration were noted, 11 by 6 mm., symmetrically situated at the inner angle of each upper lid. Similarly colored patches were present on each lower lid about 21 by 6 mm. A small spot was present at the outer canthus of each eye, and between this spot and the main growth on the right lower lid was a bridge 3 by 2 mm. The patient was thirty-two years old, married, no children, no history of miscarriage. She had suffered severely for years at her menstrual periods, and had a double

ovariotomy performed three years ago. Her mother had similar splotches, but smaller, and died of some liver disease complicating the menopause.

With a view to establishing a connection between the local manifestation and the systemic condition, Dr. David Edsall was asked to study the case, and his analysis will be published in a future report when treatment is completed. Specific gravity of the urine was 1040, and elimination was very defective. As diabetes was absent, the well-recognized xanthoma diabeticorum could be excluded. Tuberculosis and syphilis could also be excluded, the former disease presenting a rare variety of xanthelasma. The macules are usually situated near the inner canthus of the upper lids. The condition is one of the forms of fatty degeneration, cholesterin crystals and the so-called xanthoma bodies usually being present.

The treatment must be systematically eliminative, locally, the x-ray or electrolysis. The removal of the growths by operation is usually followed by recurrence.

Dr. Edsall said the examinations of the general conditions present were not yet complete, but so far had shown no definite form of constitutional disturbance. The patient gave an indefinite history of a disorder of nutrition; she had suffered with epileptiform attacks, which had given way to periods of nausea and headache. Her physical condition showed no definite abnormalities. The urine showed no evidence of diabetes, but was small in amount and had a high specific gravity, indicating poor elimination. This is common among women, and is usually due to the fact that they drink too little water. Examination for intestinal decomposition products showed only an excess of indican. Further study would be made and the results reported later.

Dr. Walter L. Pyle spoke of a case under his care about two years ago very similar in appearance to that of Dr. Ring, in which several treatments with electrolysis effected a cure without any subsequent recurrence. The patient was a vigorous Irishman of about forty-five years, who had always enjoyed perfect health. Dr. Pyle believed that, as so many of these cases were seen in robust adults, the efforts of internal clinicians to establish a relation with pro-

nounced metabolic disturbances were not likely to be followed by significant results.

Dr. G. E. de Schweinitz said that he thought it was not infrequent to find, especially in women, as Jonathan Hutchinson had pointed out, very extensive bilateral involvement of both lids. In his own practice the most extensive case had occurred in a man aged forty-two, the patches of xanthelasma being so closely placed together on the four lids that it was difficult to see any true skin between them. They had been removed on two different occasions by other surgeons, always with recurrence, and it was Dr. de Schweinitz's opinion that removal of this lesion was not a wise procedure. In recent years he had always caused the xanthelasma patches to be treated either with electrolysis, which had sometimes succeeded and sometimes failed, or, if they were small, with applications of trichloroacetic acid, which had in some instances given great satisfaction. He thought it was extremely interesting to make a general examination of these patients, as Drs. Ring and Edsall had done of the one under consideration, but it had been his experience that there was no constitutional condition especially related to the development of this disease of the skin, as many of the patients were in the most robust health. The most extensive case recorded in literature with which he was acquainted was the one described by Morax, in which the xanthelasma patches, in addition to involving most extensively both upper lids, were placed also upon the cheeks, the side of the nose, and the skin behind the ear.

Dr. Ring said he intended to exhaust the possibilities of x-ray treatment before trying any other method, as good results have been reported without recurrence for a period of two years.

Removal of a Foreign Body from the Iris.

Dr. Ring also showed the result of removal of a foreign body from the iris in the patient whom he had presented at the previous meeting of the Section. The operation had been performed one month after the accident.

After etherization the Sweet magnet was applied to the cornea and drew the portion of the iris in which the foreign body was lodged toward the cornea, but failed to dislodge

it. A small corneal section was then made, and the magnet applied to the lips of the incision. The foreign body failed to leave its exudative bed until a small area of iris presented itself through the wound. A very small iris section was made and atropine instilled. The healing process was prompt and uneventful, and normal vision was finally secured.

Dr. Hansell said he had recently seen one of the most remarkable cases of localization of a foreign body in his experience. The lens was opaque, and Dr. Sweet had located the object at its posterior pole. On application of the magnet to the front of the eye, the body was drawn through the lens until it rested upon the anterior capsule. A cataract incision was then made, the tip of the magnet inserted, and the body secured, and after iridectomy the lens was extracted. Healing was prompt and the patient left the hospital at the end of four days.

Acquired Cataract in Childhood.

Dr. Howard F. Hansell reported the subsequent history of a case of acquired cataract in childhood. The lens of the left eye became completely opaque and was removed by three discissions. The thickened capsule with adherent lens matter was extracted. Vision was restored for three weeks, and was then lost through degeneration of the vitreous and detachment of the retina. Fearful of the same results, should the same operation be performed on the right eye, the method of linear extraction was adopted. Instead of the usual capsulotomy, the anterior capsule, which had become opaque simultaneously with the lens, was extracted with forceps before expression of the lens. Healing was prompt and uninterrupted, and at the last examination the patient had excellent vision with cataract lenses. In the early stage of the cataract in the right eye central chorioiditis was detected and treated by mercurial inunctions for several months. After operation no trace of the chorioiditis could be seen. In the absence of all other causes he thought the inflammation of the chorioid might be properly regarded as the cause of the cataract. The early report of this case, with references to the literature was published in the *Trans. Amer. Oph. Soc.*, 1907.

Two Cases of Obstetric Injury of the Cornea.

Dr. de Schweinitz related the clinical history of two cases of obstetric injury of the cornea, one examined immediately after birth, and the other as a late result in an adult. In the first patient, a male baby, after a difficult forceps delivery, there was found a misshapen cornea which had assumed the appearance of a keratoglobus, with a deep anterior chamber and a diffuse haze of the cornea, thicker in the center, and which occupied this tissue entirely, with the exception of a narrow rim above and below. At first the epithelium was unaffected, but later became slightly macerated. No striae could be seen through the dense haze, and therefore no positive evidence of rupture of Descemet's membrane was obtained. The condition was evidently due to an edema of the corneal tissue, and belonged to the first of the classes established by the investigations of Thomson and Buchanan. The baby died on the eighth day. Autopsy was forbidden.

In the second case there was a delicate, slightly dotted linear opacity, 6 mm. in length and one-fourth mm. in width, in the posterior layers of the cornea, extending in a vertical direction. In other respects the eye was normal, and the vision, after the correction of a high astigmatism, reached 6/7.5. At the patient's birth instruments had been used, and in addition to the lesion of the cornea there was a scar, also caused by the forceps, 2 cm. above the brow.

Dr. de Schweinitz briefly reviewed the literature of the subject, making special reference to the capital papers of Thomson and Buchanan and a comprehensive review of the entire subject by Bruno Wolff, and thought that more careful investigation of patients who came with high corneal astigmatism, especially if confined to one eye, might reveal this early lesion of the cornea as the etiological factor.

Dr. Posey said he had seen Dr. de Schweinitz's first case, but at that time the keratoglobus had practically disappeared. He thought that the ocular muscles were often involved in these obstetrical injuries, and that many cases of congenital palsies, on careful questioning, could be traced to the use of forceps or to an unusually difficult labor.

Dr. Walter L. Pyle remarked that although almost every form of ocular injury had been reported as proceeding from

forceps delivery, yet the evil results were very small in comparison with the enormous number of cases in which this instrument was applied. It was fair to assume that in the vast majority of cases, if forceps were used with ordinary care and skill, permanent ocular injury was not likely to follow. In preparation of an editorial on this subject several years ago he had occasion to review the literature of ocular traumatism during labor.

Since then the subject had been very exhaustively treated by Thomson and Buchanan and Peters and Wolff. The chief injuries (usually from pressure of the blades of the forceps) reported were excoriations, edema, fracture of the orbit, corneal affections, hyphemia, paralysis of the ocular and eyelid muscles, retinal and retrobulbar hemorrhages, optic atrophy, cataract, dislocation of the lens, exophthalmos, and avulsion of the eyeball. Of course, it was in cases of contracted pelvis that most of the injuries occurred, but even in the course of natural labor, traumatism of the eyelids with the resultant edema and ecchymosis and conjunctival hemorrhage and chemosis were often seen. According to Thomson and Buchanan, there sometimes occurred in normal or unassisted labors, retinal and chorioidal hemorrhages. One of the most striking and curious cases of ocular injury during labor noted in ophthalmic literature was that reported by de Wecker of a face presentation in which an orbit was mistaken for an anus in breech presentation and the eyeball gouged out by the obstetrician's finger.

Dr. Zentmayer said that Peters had reported cases of congenital dacryocystitis due to stenosis of the duct as a result of injuries to the bone by forceps during delivery.

Dr. Harlan recalled a report that he had seen several years ago, in a foreign journal, of a number of cases in which minute hemorrhages at the macula were attributed to injury during labor. The author claimed that many cases of congenital amblyopia might be explained by this lesion.

Dr. S. D. Risley had seen one case, an adult with a deep scar on the right brow caused by instrument delivery. The forceps blade evidently had been applied with crushing force, displacing downward the upper wall and rim of the orbit. The left eye was nearly or quite emmetropic, but the right eye had a high grade of mixed astigmatism, which he had ascribed to the misshapen orbit.

Dr. Randall said it was more germane to Dr. Pyle's remarks than to Dr. de Schweinitz's paper to remind the Fellows that in examinations of the eyes of infants, those who made the measurements in the first day or two of life, like Schleich, found retinal hemorrhages quite constantly and the nerve head often swollen 3 to 5 D. higher than could be measured even in the same eyes a week or more later. Such findings were especially common after difficult or instrumental labors. In the prepared eyes of the newborn he had observed the same edematous swelling, as in a specimen of the late Dr. Norris, which he had put on record (*Trans. Am. Oph. Soc.*, 1888) because of its exquisite demonstration of an aberrant cilioretinal artery. The few cases of infantile myopia were probably to be ascribed to a forward subluxation of the lens, such as he had observed from trauma later in life as a temporary finding, since large series of anatomical studies such as v. Jaeger's of 70 eyes of newborn had shown no instance of axial myopia.

Dr. de Schweinitz, in closing the discussion, said that his paper had referred only to the corneal lesions of obstetric injuries, although the others which had been described were full of interest. Anyone who desired to pursue this subject would find the most elaborate record of them in Bruno Wolff's comprehensive review of this entire topic. The distortion of the cornea in his first patient, so that it had assumed the appearance of a keratoglobus, lasted only about a day, and in this respect it had followed a course presented by other similar cases. He agreed with Dr. Pyle that it was remarkable that comparatively few of these corneal injuries had been reported when one remembers the great number of instrumental deliveries, but thought that they were probably not as uncommon as they appeared to be, because since they had been thoroughly studied by Buchanan and Thomson more and more of them were appearing in literature, and doubtless many of the cases of slight linear scars which were evident in the corneas and found during the course of routine investigation, for which no adequate explanation was at hand, might be found to have an origin in a birth injury, provided the history of the patient was thoroughly investigated.

Microphthalmos, Extensive Colobomata, and Other Congenital Defects.

Dr. Walter L. Pyle reported a case of microphthalmos, with extensive colobomata, and other congenital defects in both eyes, in a young man, twenty-five years old. The family history showed no striking ocular affection or abnormality, and the patient's health had always been fairly good. In addition to the ocular conditions he presented extreme congenital torticollis, the head being bent to the left. The mental development was below normal, the countenance being dull and apathetic, but despite poor vision he was able to drive about the country without difficulty, and could read the daily newspapers if the illumination was good. Both eyes were affected with nystagmus of varying degrees.

The right eye was extremely small, the corneal diameter measuring but 8 mm. There was partial coloboma of the iris. The pupil was vertically oval and displaced downward. Fetal remnants were seen in the lower median portion of the pupillary openings. The movements of the eyeball were irregular and greatly limited in the upward rotation and almost lost in external rotation beyond the median line. Ophthalmoscopic examination showed extensive affection of the chorioid and retina, with pigmentary changes throughout the whole fundus. There was a medium-sized inferior coloboma of the chorioid and optic-nerve sheath. Vision equals 20/80, not improved by lenses.

The left eye was considerably larger, the diameter of the cornea measuring 10 mm. There was complete coloboma of iris downward in the median line, giving the appearance of the so-called "keyhole" pupil. Fetal remnants were plainly visible in the inferior periphery of the coloboma. Ophthalmoscopic examination showed an extensive inferior coloboma of the chorioid and optic-nerve sheath, simulating an enormous posterior staphyloma. The refraction was highly myopic, some portions of irregular fundus-plane measuring as much as 20 D. Vision equalled 4/200, and could not be improved with concave lenses beyond 10/200. The ocular movements were irregular and much restricted, and the power of external rotation beyond the median line was practically lost. Both pupils were respon-

sive to light-stimulus and dilated slightly under homatropine and cocaine.

The interesting feature of the case was the remarkable preservation of useful vision in a microphthalmic eye, with a corneal diameter of only 8 mm. Dr. Pyle discussed the theories offered to explain the causation of these abnormalities, and thought they were due to interference with complete closure of the fetal ocular cleft, either as the result of abnormal persistence of the mesodermic tissue or to fetal inflammation in the region of the cleft. According to Lang and Collins, the defect in the chorioid was due to an abnormal adhesion of the retina to the mesoblast. When this occurred before the retinal fissure closed, the coloboma was devoid of retinal elements; but when it occurred later, the retina was present and there was no scotoma corresponding to the colobomatous area.

Dr. Harlan said that Wild, in his book on deformities of the eye, stated that entire absence of the ball is rare, and that even when only the smallest rudiment of an eye is present, the external muscles exist. He met with a curious illustration of this some years ago in the case of an inmate of the Institution for the Blind in which a minute nodule, half the size of a pea, was in constant and lively nystagmic motion.

Dr. Risley presented for inspection the case of binocular exophthalmos which he had shown to the Section at the preceding meeting. By a process of exclusion he had then made a diagnosis of a large gumma in the region of the cavernous sinuses, retarding the circulation through them. The woman had been placed in bed, and mercurial inunctions, with ascending doses of iodide of potassium, administered. The headache had ceased within a week, the exophthalmos had disappeared entirely, the motility of both eyeballs was restored, and the visual acuity had risen from $1/5$ to $6/6$ in the right eye and $6/9$ in the left. Dr. Risley expressed the conviction that the result of the treatment had confirmed the diagnosis made the month before.

A Case of Toxic Amblyopia Presenting Some Unusual Features.

Dr. John T. Carpenter showed a patient with partial optic atrophy, with absolute central scotoma extending from

fixation point about 20 degrees in all directions, while the peripheral field was normal for white, but no colors were recognized in this area. The patient, a man of thirty-five years of age, presented the usual ophthalmoscopic appearance of complete gray atrophy without vascular changes in the retinal system. An unusual feature was the persistent and annoying subjective visual disturbance in the blind area of the field, occurring as flashes and scintillating color phenomena of red color, present at all times, but most annoying at night when lying in bed. The interesting features were: (1) The persistence of an absolute, sharply defined, central scotoma remaining unchanged for one year, with full peripheral form field and achromatopsia. (2) The diagnostic interest lay in the differential diagnosis between toxic amblyopia from alcohol, tobacco, and lead (type-setting being his occupation; chiasmal disease with central scotoma; syphilitic atrophy; and possible central nervous disease, as tabes or disseminated sclerosis, with this unusual type of optic atrophy as the earliest symptom. X-ray pictures showed no sinus disease. (3) The futility of treatment so far as restoration of vision was concerned, mercury, enormous doses of iodides, strychnine, and nitroglycerin having been faithfully tried without result. (4) The entire absence of any symptoms of central nervous disease after careful examination of the patient by Drs. Chas. K. Mills and Wm. G. Spiller.

Dr. Carpenter believed the case to be one of chronic retrobulbar neuritis from the combined action of alcohol, tobacco, and lead in a man the subject of nervous exhaustion caused by anxiety and overwork.

Dr. de Schweinitz said that he had had the opportunity of examining Dr. Carpenter's patient on several occasions, finding the conditions which have already been described. At first he thought that the optic-nerve degeneration could best be explained by assuming that it represented the optic-nerve type of tabes dorsalis, but he understood that Dr. Spiller's and Dr. Mills' investigations had entirely excluded the probability of this disease, or of multiple sclerosis, which had naturally also been considered. He thought it was not impossible that the patient's ocular disabilities should be classified with those which have been called sta-

tionary optic-nerve atrophy with scotoma, and which has been particularly described by Jensen. In these patients a scotoma develops similar to the one which occurs with toxic amblyopia, but is much more decided. There are marked diminution of central vision, depreciation of the color sense, and the ophthalmoscopic appearance of simple atrophy of the optic nerve. The process is stationary, and vision does not improve under treatment. The affection has been found exclusively in men before their thirty-fourth year. It is said to have an hereditary tendency, and was attributed to exhaustion, lack of sleep, and other circumstances of similar depressing nature. The peculiar chromatopsia of which this patient complained was a point in favor of toxic amblyopia, and had not infrequently been described in various forms of toxic optic-nerve atrophy, the whole subject having recently been elaborately reviewed, together with the presentation of cases, by Hilbert.

EDWARD A. SHUMWAY, Clerk.

CHICAGO OPHTHALMOLOGICAL SOCIETY.

At a regular meeting held December 9, 1907, Dr. C. G. Darling presented a patient whose eye had been inflamed for a week and a half, and previous to that, vision had been blurred for a year or more. There was no itching, and symptoms were no worse in the summer than in the winter. There was a slight discharge and the lids stuck together in the morning, but these symptoms are now absent. Two smears were made but no eosinophiles were found. A smear made from a small ulcer on the conjunctiva was negative. A tuberculin test was not made. The mucous membrane was normal microscopically.

Traumatic Irideremia.

Dr. Thomas Faith reported three cases of this condition which demonstrated that the diagnosis can not usually be made at once, because of the blood in the anterior part of the eye, and that there is usually quite pronounced hemorrhage into the interior of the eye. The increase of intraocular tension, which is very likely to appear within a few days after the accident, may be explained by the coming in contact with the cornea of the remnants of the root of the iris, thus shutting off drainage through the sinus angle. It is not improbable, however, that the hemorrhage is a factor in the production of the tension. Eserin is indicated and has a favorable influence on the tension in some cases. Atropin is positively contraindicated.

Dr. H. B. Young said that the result following the use of atropin in Dr. Faith's cases bears out the usual findings.

Dr. W. A. Mann referred to a case he presented to the Society several years ago, which resembled Dr. Faith's cases, but proved to be retroflexion of the iris following trauma. He could not follow the case long enough to determine whether the iris came back into place. The tension was high.

Dr. Casey A. Wood said that there is a class of cases of irideremia, of which he had seen two specimens, that is, entire evulsion of the iris following an attempt to do an iridectomy. The iris was torn away from its attachment. In one case, a case of glaucoma, removal of the iris entirely cured the glaucoma, and if there is anything in the theory, he said, that glaucoma is caused by the iris forcing itself against the sclero-iridic

angle, this case was an illustration of it. The effect of eserine in such cases he thought emphasizes the fact that eserine does not always act in glaucoma, by pulling the mass of iris away from the angle, as there was no iris to drag away from the angle.

Dr. Faith stated that he had hoped someone would explain the action of eserine in these cases. In two of his cases it immediately reduced the tension. Another point of interest in these cases was the pronounced excavation of the optic nerve, that is, in two cases, while in the third, in which the tension was as great as in the other two cases, there was no excavation at all. He interpreted this to mean that the amount of excavation depends entirely on the kind of optic disk present originally.

Tumor of Chorioid.

Dr. Charles P. Small reported the case of a woman who received a blow on the eye. Severe pain followed, lasting for three days, but the appearance of the eye was unchanged. One week later the pain returned and became very severe. A foreign body in the globe was suspected, but the skiagraph was negative. The pain ceased almost suddenly after the use of dionin, and never returned to give her much annoyance. Tension was lowered. The lids were swollen and there was a discolored spot on the conjunctiva. Vision was destroyed. The eye was enucleated and a microscopic examination of the tumor showed it to be a metastatic hypernephroma.

Dr. Casey A. Wood thought that apart from the unusual pigmentation present in the tumor it suggested that it might be a necrotic area, a cholesterol deposit which had broken down. He had never seen anything resembling in appearance the sections of this tumor, and believed it to be another example of undiagnosed intraocular tumor. He agreed with Dr. Pusey that all useless, blind and painful eyes should be removed, and referred to Dr. Small's case as supporting this statement. There are, he said, many cases of intraocular tumor that are impossible of diagnosis, and a large per cent. in which diagnosis is very difficult.

Dr. Carlton, who made the microscopic examination of the tumor, stated that hypernephroma is a rather rare tumor. It may or may not be malignant. It is adrenal in structure and is believed to originate from an embryonic remnant either in

the kidney or occasionally attached to the kidney, either within or without the capsule. The secondary tumors are peculiar in that they are discovered accidentally. In one case reported there was a metastatic tumor in the humerus which caused a fracture of that bone when the individual lifted a stovelid. The arm was removed and no recurrence took place. In another case the secondary tumor was removed; there was a recurrence, and then none for two years. In Dr. Small's case it was impossible to diagnosticate the presence of a primary tumor, but the intraocular tumor did not resemble any other variety of tumor and contained cells identical with those seen in hypernephroma, that is, endothelial in character, and, further, inasmuch as there is not normally endothelium in the eye, it was safe to assume that the tumor was a metastatic hypernephroma. Some of the cells in the tumor are pigmented, but the cells of the cortex are normally pigmented. The pigmentation might also be due to the fact that the tumor was situated in the pigmented organ, and by pressure atrophy, melanotic granules were scattered in the stroma of the tumor, and were taken up by the cells. If the tumor is not a metastatic hypernephroma, Dr. Carlton thought that in all probability it would have to be called an endothelioma taking its origin from some of the vessels in the chorioid.

Dr. Small called attention to another interesting feature, namely, that Bowman's membrane was intact, so that a foreign body could not have penetrated the cornea.

Exhibition of Specimens.

By Dr. Henry Gradle.

(1) Complete enucleation of an eye, with the unexpected discovery of a foreign body in it. The patient, a young woman, 29 years old, was injured by a nail when ten years old. The eye was sore for a few weeks, and then gave no further trouble except that she was blind in that eye. During June, 1907, there was pain for the first time, and an inflammatory reaction. There was no doubt about the eye being blind; the lens was cataractous, and there was tenderness indicative of cyclitis. It was impossible to quiet the eye until after the use of sodium salicylate, atropin and dionin having failed. A slight ptosis persisted. Last fall the inflammatory reaction recurred again,

and when the conditions would not subside the eye was enucleated. A bit of a nail was found firmly embedded in the optic nerve head. It was not fully exposed, but the magnet demonstrated its presence. The iris is completely adherent to the lens; the lens is cataractous, and the chorioid is entirely bleached. There is a hole in the iris through which the foreign body evidently entered. The interesting point is that the eye tolerated the foreign body for nineteen years.

(2) A child, apparently in good health, suffered from inflammation of one eye during the eighth month, without known cause. That eye never became quiet. In the course of a year it shrunk until now it is a perfectly quiet atrophic stump with opaque cornea, without tenderness. The other eye became involved soon afterward. Dr. Gradle saw the child first in April, 1907, when it was 28 months old. In the second eye there was a typical high-grade iridocyclitis, beginning to subside. The iris was tied down, there was moderate irritation, with no evidence of perception. There was no reason to suspect anything except iridocyclitis, possibly tubercular in origin. The eye was normal in size. Atropin was prescribed. During the summer the eye had enlarged, and had given the child discomfort. A raw granulating bleeding surface protruded from the lens, evidently causing the child much distress. The eye was enucleated. The tumor, which was present, had destroyed the greater part of the cornea, therefore the enucleation was made complete. The wound healed well and there was no reaction. On cutting through the tumor it was found that there was nothing left of the eye except the sclera and the periphery of the cornea. The rest of the contents of the eye had been changed into a mass which in the rear of the eyeball looked like a glioma, but in the front was a fungous-like granulating, bleeding tissue permeated by hemorrhages, and between the yellowish-white gliomatous masses and the fungous masses there was a large caseated spot. The microscope showed a glioma with hemorrhage into the anterior part of the tumor.

(3) Young man, with high degree of hyperopia, and convergent strabismus, which was corrected by the use of glasses. The greater hyperopic eye showed vision of about 1-5; in 1900 the boy was injured by a brick. The glass of his spectacles cut his eye, causing a small wound at the junction of the cornea and sclera. The iris seemed to protrude subconjunctivally.

He attempted after forty-eight hours to snip it off, but the forceps grasped nothing. The wound healed kindly and there was no trouble until this summer, when the eye began to pain and it was tender to touch. In October he found a cyst of the iris. The iris had prolapsed into the wound at the time, but did not protrude. There was simply adherence of the iris to the edge of the wound, and the lower nasal edge of this incomplete coloboma had become changed into a cyst. Atropin gave relief for the time being, but an iridectomy had to be done. It proved to be very difficult, but was finally excised. Evidently the cyst had adhered to the cornea, because after the wound had healed there was at the lower part of the cornea, where the cyst had been, a slight vascularity and grayness. Healing was uneventful, and sight was as good as before. The eye was perfectly quiet.

A few years ago Dr. Gradle operated on a similar case with similar fortunate results. It was also a traumatic case, with entrance of the iris into the wound. The cyst in that case was of the size of a small pea, and was pressed against the cornea, causing cloudiness and reducing vision to 1/10. Iridectomy in that case was done easily, and a month afterward vision was nearly 20/30. The cyst was cut out in a single mass.

Use of Atropin in Sympathetic Ophthalmia.

Dr. H. B. Young, Burlington, Iowa, reported a case of a man with one eye enucleated, and the second eye involved. The origin of the trouble was a gonorrheal ophthalmia. The one eye showed much swelling of the cornea, and in the other there was a small perforation, with a large corneal staphyloma. A puncture was suggested, but refused. The attending physician did puncture it eventually, and now tension is plus, and the incarcerated portion of iris is protruding quite markedly. This is the ninth week of treatment. A two per cent. atropin solution is being used; the patient has been thoroughly mercurialized, but the increase in tension is becoming more marked. The questions are: How much has the atropin to do with it? How much is due to the atropin when the iris is tied up in the corneal cicatrix? Will it make more trouble to use atropin than to omit it? The pupillary space is filled up. Has the atropin aggravated the increase in tension? There is very little pain. Is a paracentesis advisable with sclerotomy? Is there any hope of saving some vision in the affected eye?

Dr. Gradle said that in his case the iris was adherent. He recalled two other cases of blind eyes, with cataractous lens, adherent iris, and recurrent attacks of iritis. Unmistakable benefit resulted from the use of atropin. He suggested that there probably was a little leakage between the anterior and the posterior chambers. In one of the cases the stoppage of the atropin was followed by a ciliary injection, and discomfort, and on its resumption the symptoms diminished in severity. In one case of severe iritis the tension was distinctly plus, but Dr. Gradle did not stop the use of the atropin, and the case terminated in recovery.

Dr. Casey A. Wood did not believe that it would make much difference whether atropin was used or not, because of the changes that had taken place in the interior of the eye. He did not believe that in every instance the exact *modus curendi* of atropin could be determined any more than in the case of eserine. He did not believe that atropin always causes the tension to rise, nor that eserine is always indicated in plus tension, because conditions vary. The local sedative effect of atropin can not be questioned, and for that reason he thought that Dr. Young ought to continue the use of atropin.

Dr. George F. Suker referred to two cases in which he used powdered dionin, without getting any reaction. It had not been used before in either case. He also used it in solution, with the same result.

MORTIMER FRANK, *Secretary*.

COLORADO OPHTHALMOLOGICAL SOCIETY.

Meeting of December 21, 1907, in Colorado Springs. Dr. Edward R. Neepor, presiding.

Lenticular Opacities.

Dr. A. C. H. Friedmann presented the following cases: (1) Mrs. L., aged 62, showing arterio-sclerosis, chorio-retinitis and incipient cataract. (2) Mr. C., aged 28, with monocular, anterior, congenital, capsular cataract. (3) Miss S., aged 34, showing symmetrical opacities in both lenses, extending diagonally across the lower-inner quadrant. (4) E. R., aged 8 years, with slight haziness in both lenses and dense opacities of each cornea. Dilatation of the pupils had shown that the lenticular opacities were real, not shadows caused by the corneal leucomata, and mydriasis produced no improvement in vision. There was a history of one attack of meningitis.

Discussion.—In the first case Dr. Melville Black called attention to the "silver-wire arteries" and other signs of far-advanced arterio-sclerosis, and advised treatment directed to the heart and circulation.

Cholesterin in Anterior Chamber.

Dr. E. R. Neepor showed Mrs. J. R. T., aged 49, with a family history of myopia and early cataracts, in whom cataract of the right eye had developed at about 29, and of left at about 35 years. The right lens was extracted in July, 1902, the left about three months later. Right vision was better than the left for about a year after operation; then it failed gradually, blindness resulting two years later. In December, 1907, pain was felt in the right eye for the first time, together with a foreign body sensation. Examination revealed an irregularly shaped mass of cholesterin crystals, occupying the lower fourth of the anterior chamber, irritating both the iris and cornea by contact.

Many isolated crystals showed on the upper three-fourths of the iris, and in the pupil. There was no fundus reflex, and the tension was minus. The left eye showed opaque capsule and V.=4/200.

Discussion.—Dr. Friedmann stated that he had attended

this patient in 1902, when about 20 D. of myopia existed. The cataract extraction in the right eye was accompanied with a large hemorrhage from the iris. The patient proved intractable. V.=5/6, after slow healing.

Dr. Melville Black considered removal of the irritable, blind eye advisable to prevent sympathetic ophthalmia.

Dr. G. F. Libby agreed with this, advising dionin locally to relieve distress until enucleation was done, and advised needling the left eye.

Changing Lenticular Opacities.

Miss M. S., aged 32, a teacher, was also presented by Dr. Neeper, having consulted him for asthenopia with low error of refraction, in September, 1903. Vision was then normal. Family history tubercular. Numerous pin-point opacities were scattered throughout each lens. When seen in December, 1907, the vision was still normal, with or without correction, and Dr. Neeper considered the opacities less dense, larger and of irregular form.

Attempted Absorption of Cataract.

Dr. Neeper also presented a half dozen cases showing opacities of the lens, variously placed and of varying size, from the striae of incipient cortical cataract to well-marked nuclear opacity. These patients, and about eighteen more, observed by him in the past two years, and reported fully at this meeting, were elderly people. Local and constitutional treatment had been employed. Dionin had at first been instilled in the office, beginning with 1 per cent. solution and increasing to 5 per cent.; after this was well borne, 5 per cent. was instilled daily at home. Internally the following general lines of treatment were followed: Magnesia sulphate was first given to produce free catharsis; followed by a mild purge from calomel once a week; syrup of hydriodic acid, 10 to 30 minims t. i. d.; free water drinking, and limited use of coffee. In two cases, close work was permitted during two months of dionin treatment, the visual condition growing worse. On discontinuing close work, but keeping up the dionin, improvement occurred in the next month.

Dr. Neeper thought hyperopic eyes were rendered liable to cataract from the added effort of accommodation; while in

myopia the cause was malnutrition. In opacities of a light milky tint, with vision of 20/60 or more, he had seen improvement in vision, and encouragement of patients in 98 per cent. of cases. He always reduced the amount of close work, and had never seen ill effects from using dionin. His cases showed generally improved vision. The patients shown at this meeting made positive statements as to improved vision since this treatment was begun.

Discussion.—Dr. J. A. Patterson had observed benefit from dionin used in vitreous opacities. Even when the test type showed no improvement in vision, the patients got a better view of objects, and were more comfortable. He had never seen any harm come from the use of dionin.

Dr. Friedmann doubted if all lens opacities should be treated by dionin, but would like to see it tried in mature cataract, and also in some complications of cataract. He would not use it in cataract with glaucoma. When improved vision could not be demonstrated on the test type, he would attribute it to anticipation and mental effect.

Dr. E. M. Marbourg had used dionin powder in hundreds of cases in hospital work, with good effect only. He always gave iodine in reduced doses in the old.

Dr. Black urged careful classification of opacities, as capsular, cortical and nuclear. Cortical cases showed the best results, while those showing extensive lens involvement were not promising. He believed dionin delayed or reduced the development of opacities. In patients of seventy or more, if dionin did this, he would permit a rather free use of the eyes for close work, on account of the mental effect.

Drs. Magruder and Libby had seen but little benefit from dionin in senile cortical cataract thus far, but would use it further, together with Dr. Neeper's plan of constitutional treatment.

Dr. Black reported a man of 70, V.=20/40, and with slight lens haze, able to read Jaeger 2 at 10 to 14 inches without glasses.

Dr. Libby reported much improved vision, lessened nystagmus and squint, and little or no photophobia, in the albino child presented at the October, 1907, meeting; the improvement being due to wearing correction of 4 D. of mixed astigmatism, in amber lenses.

Meeting of January 18, 1908, in Denver. Dr. Charles E. Walker, presiding.

Acute Glaucoma Following Homatropin Cycloplegia.

Dr. A. C. H. Friedmann reported a woman of thirty-seven who had consulted him recently for a change of glasses, stating that three days after examination under a mydriatic three or four years before, the left eye became blind. After three days of active treatment vision had returned. Finding fundus and tension normal in each eye at several visits, and failing to get a reply to a letter sent to her former oculist, Dr. Friedmann instilled three drops of 1 per cent. homatropin in each eye, January 10, 1908. With correction, R. V.=5/5, L. V.=5/4. Following the examination, 1 per cent. pilocarpin was dropped into both eyes. That evening the patient complained of blindness in the left eye, and about midnight sudden and severe pain, for which heat was ordered.

The next day acute inflammatory glaucoma was well developed, with hazy cornea, obliterated anterior chamber, medium-dilated pupil, fundus invisible, tension between plus 1 and plus 2, V.=fingers at $1\frac{1}{2}$ meters. Eserin was then used (first $\frac{1}{4}$ per cent., then $\frac{1}{2}$ per cent. solution), together with cathartics, heat and the high frequency current. The last seemed to relieve the pain and lacrimation. On the second day no improvement showed.

On January 13th this patient consulted Dr. Edward Jackson, who found the cornea steamy, the iris thick and swollen, conjunctiva chemotic, pupil 6 mm., tension between 1 and 2 plus, V.=fingers at 2 feet and evident severe pain. A posterior sclerotomy was immediately performed, the tension becoming normal, pupil 5 mm., vision=fingers at 4 feet. A good night followed this operation. The day following, the pupil became larger. 1 per cent. eserin had no perceptible effect on the condition. On January 15th Dr. Jackson did a broad iridectomy, under general anesthesia. The corneal incision was carried up into the sclera and a conjunctival flap was made. The iris, which was friable, was cut back to its attachment. The acute inflammation subsided and vision slowly improved.

Discussion.—Dr. W. C. Bane referred to a man 30 to 40

years old, seen by him years ago, suffering from acute glaucoma, and who refused iridectomy. Under the use of hot applications and belladonna *internally*, by a homeopathic practitioner, the disease was apparently cured.

Dr. D. A. Strickler reported acute glaucoma following the use of homatropin in a woman aged thirty-two. The condition subsided quickly under eserin, heat and pulsatilla.

Dr. F. R. Spencer spoke of mydriasis appearing two weeks after the use of atropia in an eye injured two years before. After two months' use of eserin the pupil became normal, vision rising from 15/70 to 15/30 plus.

Dr. C. A. Ringle had seen slightly lowered vision, with normal fundus and tension, but no glaucoma, following cycloplegia in a case of compound myopic astigmatism at 45 years.

Dr. C. E. Walker related a case of glaucoma in high myopia, which followed the use of a mydriatic for keratitis. Relief followed iridectomy.

Dr. E. R. Neepier had found that the high frequency current relieved pain and was more help than miotics in acute glaucoma, and it was relied upon by him when iridectomy was refused.

Dr. M. Black referred to a case of glaucoma relieved as to one eye for five years by the use of eserin, and as to the other for the past three years by eserin and the high frequency current. He had found relief from pain by the use of this current.

Dr. E. W. Stevens had seen but one case of acute glaucoma from homatropin used as a cycloplegic, when 2½ per cent. had been used at 30 years. He believed in the safety of homatropin used as a diagnostic means in suspected glaucoma, if soon counteracted by eserin.

Dr. J. A. Patterson reported retinal hemorrhages in a man of 40 with slight kidney disturbances, following unwonted activity. The use of high frequency current was followed by iritis after the third application. Chronic irido-cyclitis developed eventually, with tension plus 2. Eserin proved irritating. Three anterior paracenteses were made, one iridectomy, and three posterior sclerotomies. Dionin gave most relief, finally.

Dr. Jackson resorted to homatropin in diagnosing suspected glaucoma, if the patient would consent to immediate iridectomy, if required. Vision was likely to return if operation was

done within ten days, except in fulminating glaucoma. He referred to Dr. Hyel's case in which glaucoma followed the use of duboisin. Iridectomy saved the sight of one eye, while that of the other was subsequently lost, although recurring glaucomatous attacks at first seemed to yield well to *eserin*.

Entropion.

Dr. W. C. Bane showed a woman, aged twenty-four, with entropion of the lower lid. Treatment by collodion, and by removing an elliptical piece of skin had proved of no benefit to the lid, which showed some symblepharon at the fornix. About the middle of the outer side of the lower lid a condition resembling chalazion presented.

Discussion.—Dr. Walker suggested beginning pemphigus of the conjunctiva, as shown by cicatricial changes in the lower cul-de-sac.

Dr. W. A. Sedwick showed a man, aged thirty-four, in whom flying glass had cut through the upper eyelid, conjunctiva and part of the sclera, seven weeks before. Intra-ocular hemorrhage, including the anterior chamber, occurred immediately.

Under heat, boric acid, collyrium and atropia, vision returned to 20/20 in three weeks. Floating débris remained in the vitreous. Iritis soon developed, but cleared under atropin. When shown before the society, a fixed thin web-like opacity, and a movable but small mass of débris was observable in the vitreous.

Superficial Keratitis.

Dr. C. E. Walker presented an old woman with nontraumatic superficial keratitis and brown corneal opacities deeply situated. The lower outer quadrant of the cornea showed a grayish film. He thought cyclitis the probable underlying condition.

Discussion.—Dr. Bane related a similar case in his practice. Dr. Jackson thought the deep deposits were probably due to uveitis.

Adherent Leucoma.

A boy was shown by Dr. Walker with the lower half of the cornea densely opaque and adherent to the iris, due to an

old injury from the claw of a cat. Frequent and painful hemorrhages into the anterior chamber occurred.

Discussion.—Dr. Neepor noted three tears in the iris, and questioned the probability of the lens being included in the scar.

Retinal Detachment.

A woman of 45 was also presented by Dr. Walker, showing a small detachment of the right retina, associated with 4 D. of myopia, correction of which gave vision of 20/40.

The field of the other eye was contracted to 10 degrees. Attacks of pain were benefited slightly by dionin, more by the high frequency current.

Discussion.—Dr. Jackson thought the right disk was red, hazy and dragged (i. e., the nasal border was more prominent than the temporal), and considered myopia the cause of this and of the pain.

Exclusion of the Pupil.

Dr. Melville Black presented a man of forty, a heavy smoker and drinker, in whom the pupil had become excluded, except for a very small space above, the result of delayed treatment of iritis two years before. Iritis had again developed recently, and had been relieved by free use of atropin and dionin. Auto-intoxication and low blood pressure were discovered. Treatment by sodium iodid and mercury protiodid was proving beneficial. Dr. Black raised the question of prompt iridectomy, speaking of another case of pupillary exclusion followed by occlusion and loss of the eye.

Discussion.—Drs. Walker and Bane advised iridectomy.

Dr. Stevens used atropin in weaker solution, but more frequently than formerly, and associated dionin with it. When adhesions persisted he waited about two weeks for them to atrophy, and then cocainized the eye and applied atropin again, often with final breaking of the synechia. He also mentioned success in promptly treating one eye of a woman aged seventy, with dionin and atropin; whereas circular synechia developed in the other through delay in seeking treatment. Atropin did not help this second eye, but dionin kept it comfortable.

Report of Cases.

Dr. G. F. Libby reported *monocular interstitial keratitis* in a woman of twenty-two, appearing nine months after the chancre of acquired syphilis developed on the lip. It was nonulcerative, moderately inflammatory, and vision fell to counting fingers at two feet. The rash had appeared early and was successfully controlled by mercury hypodermically, once daily for forty days. Then protiodid of mercury, gr. $1/4$ t. i. d., was given; and later potassium iodid, gr. v to xxx, t. i. d.; both to be kept up, with occasional intermission for two years. Under local treatment by atropin, yellow ointment, heat and dionin later, the cornea cleared in three months, except for a few thin corneal nebulae, and vision became normal.

Dr. A. C. Magruder made a preliminary report on the use of Calmette's *ophthalmo-tubercular reaction*; finding instillation of the serum into the eyes caused a reaction in cases of pulmonary tuberculosis, but none in the absence of this disease. One-half per cent. was the strength used.

Dr. Neepier reported high *anisometropia* in a girl of twenty, who wore with entire satisfaction R. $+ 0.50$ \ominus $- 3.50$ cyl. ax. 180° . L. -7.00 \ominus -4.00 cyl. ax. 180° . The correction was made under homatropin; the complaint being lateral headaches.

Discussion.—Dr. Black had found patients with full correction of anisometropia complained of looking down, which he attributed to hyperphoria of the eye wearing the stronger lens.

Dr. Ringle harmonized the difference between the eyes gradually.

Dr. Walker gave one pair of glasses for distance, and another for near.

Dr. Neepier tipped the frame downward to average the difference, if over 2 degrees; he had harmonized 4 degrees of difference. He believed the peripheral images and the prismatic effect caused the trouble, and spoke of Knapp's case of a boy who tolerated a lens for aphakia in one eye.

GEORGE F. LIBBY, *Secretary*.

ST. LOUIS MEDICAL SOCIETY.

OPHTHALMIC SECTION.

Meeting of October 9, 1907. The vice-chairman, Dr. J. M. Ball, presiding.

Eyeball Containing Bone.

Dr. A. Alt. I have brought with me part of an eye which I removed a few weeks ago on account of sympathetic irritation. I had seen the patient fifteen years previously when he was a child four years of age; he had then a large leucoma of the right cornea following blennorrhea neonatorum, in which a little space was clear enough to warrant the making of an iridectomy, which I did. I had not seen the patient again until two or three weeks ago, when he came to me complaining that for two years he had had severe pain in his eye, with symptoms of sympathetic irritation. When I examined his eye I felt distinctly that it contained bone, and advised the removal of the eye, to which he consented. The sympathetic irritation disappeared at once. An interesting fact was that the wound bled for nine days, first quite freely and then oozing until it gradually stopped nine days later. I inquired whether he bled unusually freely when he cut himself, and was told he did; so he evidently is a hemophilic. I want to call your attention to the large anterior chamber, calcareous cataract and large bony shell at the posterior pole of the shrunken eyeball.

Forceps for Fixing the Everted Eyelid.

Dr. A. E. Ewing. In many of the operations for entropion by the subsection method that I have seen performed by Drs. J. Green and M. H. Post, as well as in those of my own experience, I have frequently observed the knife slip a little to one side or the other in the division of the tarsus, because of the lack of a firm support to the lid. This would result in an incision with irregular margins. In a search among various forceps and clamps that have been proposed for fixing the eyelid I found that only the one devised by Ratti could be used for working upon the lids when everted, and at the same time give sufficient exposure of the undersurface of the lid for an extensive wound near the margin.

This instrument serves very well, but does not control hemorrhage efficiently. The several instruments here exhibited, descriptions of which may be found in the *American Journal of Ophthalmology* (February, 1903, and March, 1905), represent my efforts to devise a forceps which could control hemorrhage. The present one is an improvement upon that described in 1905, as it bears a plate against which the lid may rest, while the incision is being made. In its application the plate is placed against the skin and the thinner blade is passed back of the tarsus on the conjunctival surface. With it, either the upper or lower lid may be held firmly in an everted position, while performing the incision, and the hemorrhage is very well under control.

As to the operation itself, considerable experience with it has convinced me that it is rendered much more efficient and permanent by suturing the conjunctival edge of the standing or orbital portion of the tarsus into the bottom of the wound made by the tarsal incision, the sutures passing through the lid at the base of the cilia and being tied either upon the skin or on the conjunctival surface in the wound, as may be preferred. By this means the margin of the lid and the cilia are everted and are compelled to heal in the position desired. Up to the beginning of the present year I have employed this method upon forty-six different lids, thirty-one upper and fifteen lower. I have been able to keep track of thirty-seven of them and know positively that the results have been good. Three of the earlier ones upon the upper lids were partial failures. Two of these I repeated with entire success; the other has caused so little annoyance that I am still keeping it under observation, as the few irregular cilia are gradually coming into line with those that are practically normal. In one of the lower lids there was also a partial failure, because of the incision having been made too near the lid margin. This has been rectified by a repetition of the operation. Eleven of these upper lids and three of the lower had previously been operated upon by other methods from one to three times.

I have seen Dr. Green use only small interrupted sutures for closing the narrow skin wound which he formerly made near the base of the cilia. In the text books there is illustrated a suture credited to him, which, in the upper lid, is passed through the margin of the lid into the skin wound, then is re-

entered beneath the skin in the same direction and brought out upon the skin well above the wound. I do not remember whether this suture was doubly armed, and I do not know how it was tied.

For the last twenty years in all of these operations that I have seen him perform, Dr. Green has not removed the narrow strip of skin, and has depended upon contractile collodion for causing the eversion, usually painting enough upon the skin opposite the wound immediately after the incision to maintain the eversion sufficiently to cause the wound to gap, but not to interfere with the circulation, and the following day adding more until the gaping was wide and the eversion was excessive. This splint, if we may so call it, was repeated as was necessary and continued for two or three weeks until the healing was well established. His idea was to do as little injury to the tissues of the lid as was possible, consistent with successful results. For the upper lid the results were usually satisfactory, but so poor in the case of the lower lid that in place of his operation he always resorted to some of the skin methods. Personally I have had better success upon the lower lid with operation than I have seen with any other method, but it frequently failed. These failures have been an incentive to me to devise this modification.

Discussion.—Dr. John Green, Jr., stated that through the courtesy of Dr. Ewing he had been instructed in the technique of this operation several years ago. One of the principal advantages of this modification consists in the permanency of results. As to that, he thought there can be no question. On one occasion he operated on a patient that had been previously unsuccessfully operated by the Green method. He did Dr. Ewing's operation on all four lids. The operation was done three years ago, and the result is as perfect to-day as it was at first.

If it becomes necessary to repeat the operation it can be done without impairing the integrity of the lid structures. That should count for a good deal in the selection of any operation. The quill suture, which Dr. Ewing has described, insures a more complete eversion of the anterior flap, and at the same time prevents cutting of the skin surface by the fine sutures that pass through the lid. Dr. Green had been perfectly satisfied with the operation and expected to do it to the exclusion of all others.

Dr. M. Wiener stated that he had performed the operation a number of times, and believed as far as the lower lid was concerned it gave most excellent results. For the upper lid, however, he was inclined to adhere to Hotz's method.

Dr. Ewing stated that the pressure exerted by the clamp was not painful, and yet was sufficient to control hemorrhage.

Staining of the Lower Lid from Injecting Argyrol into the Lacrimal Sack.

Dr. F. L. Henderson. The patient complained of epiphora, which had lasted a year. Stenosis of the duct and catarrh of the sac were found. Treatment consisted in washing out the sac daily with 10 per cent. argyrol solution. This was done by inserting a syringe into the upper canaliculus and allowing fluid to escape through the lower. On one occasion the sac wall gave way and the solution passed into the sub-cutaneous tissue. Great swelling and discoloration followed. Potassium iodid internally in increasing doses was ordered. In one week the swelling had disappeared and the discoloration was reduced to a slate colored strip in the lower lid. The stenosis and epiphora responded quickly to treatment. A slight but perceptible discoloration persists. Potassium iodid internally and externally in the form of an ointment has been tried. Mercury bichlorid ointment was rubbed in faithfully with no result. Potassium iodid by cataphoresis was unsuccessfully employed. Patient refused to allow any hypodermic injections into the discolored tissue. The questions involved are: (1) What is the composition of the stain? (2) Is there any agent which will bleach or cause the stain to be absorbed? (3) How are we to get the bleacher or absorbent into contact with the stain—by the stomach—hypodermatically, by inunction, or by electricity?

Discussion.—Dr. M. H. Post thought that in case of such an accident it would be well to use a hypodermic injection at once, in order to get the solution of iodid of potassium in contact with the argyrol at once. In his case, there being no lining membrane to the chalazion cavity into which the argyrol had been injected, iodid of potassium was injected directly into the tissue. Dr. Alt stated that he had been so unfortunate as to have had a similar case to that of Dr. Henderson. He made an injection of argyrol with a small syringe of the eye

dropper type with a fine gold tip, which did not allow of much force. He had frequently made such injections without trouble, but this time it went where he did not want it. Having heard of Dr. Post's case a little while before, he at once ordered the patient to take iodid of potassium, 10 grains three times a day. That day there was no discoloration to be seen, but the next day she came to the office and said, "Doctor, you have given me a nice black eye. Just look at me." He increased the dose of iodid of potassium, and each day the discoloration was less, and after five or six days no discoloration was seen. Probably the rapid bleaching was due to the prompt treatment with iodid of potassium. He did not wait for any discoloration to show itself—he was sure it would soon begin.

Dr. J. C. Buckwalter stated that he had an experience similar to Dr. Henderson's, but that the discoloration rapidly cleared up and disappeared entirely in about four months.

Dr. H. Muetze stated that about two years ago he treated a patient for double dacryocystitis a number of times by sounding and injections of 10 per cent. argyrol solution. One day this same accident happened, as related by Dr. Henderson. Within a few minutes the right lower lid had assumed a dark blue discoloration, and in about ten minutes both lids were so badly swollen that the patient could hardly open the eye. He advised cold applications and gave iodid of sodium internally, and within three months the discoloration, which later had changed to a light brown, had disappeared.

Dr. John Green, Jr., stated that on one occasion a weak solution of silver nitrate, intended for the sac, found its way into the cellular tissue of the lid. A pressure bandage worn for several days reduced the swelling. The staining was never very intense and soon cleared entirely.

Dr. Henderson, in conclusion, said he had come for consolation, and had gotten considerable, but not much help. The precipitate that is formed in the solution of iodid of potassium and argyrol, is a slate-colored precipitate, small in quantity. On shaking the solution the whole becomes dark again. He feared that in rubbing into the lid an ointment of iodid of potassium he had not accomplished anything, owing to the dark residue which union with argyrol leaves. He would like to find something that will dissolve the slate-colored precipitate. The chemist who is working on this thinks it is oxid of silver.

Yesterday he said he had found a perfect solvent for it. He poured his solution into the precipitate, and in a very short time it all dissolved. The solvent was prussic acid, which of course precludes its use.

A Case of Unilateral Diphtheritic Conjunctivitis.

Dr. W. H. Luedde. J. W., male, 13 months old, first seen June 29, 1907. The patient had some fever and a sore mouth showing white patches supposed to be thrush. Inspection revealed a membrane attached to the palpebral conjunctiva of the upper and lower lids, completely covering but not attached to the globe. This membrane was easily removed. The membrane rapidly reformed on the conjunctiva of the lids and persisted for a long time, not having entirely disappeared when the parents removed the child from the hospital about five weeks after the beginning of the trouble. 15,000 units of diphtheria antitoxin were given in all. Bacteriological examination demonstrated the presence of the Klebs-Loeffler bacillus first on the conjunctiva of the left eye, later in the mouth and nose. Right eye was never involved. The white patches in the mouth showed no signs of thrush on microscopic examination. There was present, however, a short rod-shaped bacillus that could not be identified, but in some respects resembled the Klebs-Loeffler bacillus. Later examination proved the presence of the Klebs-Loeffler bacillus in the mouth.

Discussion.—Dr. E. H. Higbee stated that at the St. John's Hospital clinic he had observed a case of a child seven years old, who manifested diphtheritic conjunctivitis in the left eye. To casual observation the case appeared to be one of purulent ophthalmia, but on closer inspection he found a membrane firmly attached to the palpebral portion of the conjunctiva. In the center, just in front of the cornea, the membrane had not entirely closed, and through this opening one could see the freely movable eyeball.

The child had a temperature of 102° F. She was given 4000 units of antitoxin the first day, and as there was very little improvement on the second day, she was given 3000 units more. Laryngeal diphtheria manifested itself in her sister about this time. The father objected to our using any more antitoxin, as he thought we were affiliated with the druggist for the purpose of fleecing him.

The child was taken to the O'Fallon dispensary where treat-

ment was continued. It was learned later that the child made an uneventful recovery. Cultures verified the diagnosis.

Meeting of November 13, 1907. The vice-chairman, Dr. Ball, in the chair.

Congenital Defect of Abduction with Retraction of the Globe in Adduction—(Patient).

Dr. John Green, Jr. This case is a typical example of that peculiar congenital anomaly of the ocular muscles, in which the globe is retracted into the orbit in adduction, and comes forward and is restricted in abduction. It is the second case I have encountered of this rare condition of which there are only about sixty cases in the literature.

Discussion.—Dr. Alt stated that recently he had had occasion to see a case which probably had the same congenital cause. This patient could not raise either eye above the horizontal line; attempts to raise the eye provoked a nystagmus.

A New Attachment for the Skiascope—(Demonstration).

Dr. E. H. Higbee. In nearly all instruments for measuring the refraction of the eye, a chin rest is provided for the purpose of keeping the patient's eyes in one position. This is a mistake which I have endeavored to obviate by constructing an eye-piece, much the shape of an eye-cup; when you place the patient's eye inside the cup he will keep it permanently in the one position. This attachment I have made for the skiascope. The cup is attached to one end of a flat spring, the other end having a lug which drops into small holes on the skiascope disk. These holes are placed in such a position that the lug on the spring drops into them, as you turn it. The eye-cup, being on the other end of the spring, comes exactly opposite the lens each time. In the instrument, that I have made, the lenses are much smaller ($\frac{5}{8}$ inch in diameter) than those in the ordinary skiascope, but by having the eye permanently fixed I find that my results are just as good as with the larger lens, and the work can be done with just as much facility. Another advantage of the eye-cup is the fact, that it excludes all rays of light, except those which come from the skiascope mirror.

This is an inexpensive attachment which can be made for

any skiascope in which the lenses are inserted around the margin of a circular disk. The middle of the spring is bored out in such a manner that it can be attached to the axis upon which the disk turns.

Discussion.—Dr. J. Ellis Jennings stated that he thought Dr. Higbee's model a very convenient arrangement; its distinct advantage consisting in the fact that the eye shield excluded all light, except that coming through the pupil.

Congenital Aniridia with Cataract—(Patient).

Dr. John Green, Jr. E. J., 26 years old, male, native of Missouri. Family history absolutely negative with reference to any ocular defect. "Something queer" was noted about the patient's eyes at birth. Vision had never been good, but up to the age of fifteen the patient could see sufficiently well to distinguish the larger letters of the school book by holding it very close to the face. The left eye has always been the better one. About three years ago vision began to fail in the right eye, and within the past year in the left also. There has never been any definite ocular pain but at times a vague aching in the temples. Examination shows a clinically complete absence of both irides. Both anterior chambers are shallow; in the right the lens comes forward almost to Descemet's membrane. Both lenses are cataractous, the right more opaque than the left, and tremulous. There is horizontal nystagmus. Both corneae measure 10 mm. in diameter and present a delicate peripheral infiltration in the deeper layers; there are also a few pin-head spots of infiltration nearer the center. The eyes are kept half closed. After eserine both chambers become deeper and one can see the circumferential space and fibers of the zonule of Zinn. The left lens is densely opaque centrally and presents capsular opacities, as well as changes in the lens substance in the periphery. R. V. perception of light, L. V. fingers (uncertainly) at one foot. On needling the right lens there was a gush of soft lens substance that sank to the bottom of the anterior chamber. After operation tension was somewhat raised, but lowered under eserine salicylate and dionin. Tension is now equal on the two sides, but slightly plus. R. V. with plus 13, sph. 16/120.

Discussion.—Dr. Saxl stated that he had seen two cases of aniridia. One was a man with aniridia and cataract who was operated upon by needling. The second case was a boy who

had complete bilateral aniridia. His vision was better than one would expect.

Dr. Green asked for opinions of members as to the future treatment of the operated eye. Tension in the operated eye was now about equal to that in the unoperated eye. These cases bear operation badly. Iridocyclitis and glaucoma are the complications most to be feared.

A Case of Homonymous Quadrant Anopsia—(Patient and Abstract).

Dr. Llewellyn Williamson. Patient, a healthy man of sixty, came to the eye clinic, Washington University Hospital, October 15th, saying that he was having some difficulty in reading; that only a part of the line was visible, and that when he looked at objects he saw only part of them; when looking at a horse and wagon, for instance, he would see the horse, but not the wagon. At times he saw flowers, butterflies, etc., before his eyes.

R. V. 15/30, with plus 0.25, sph. 15-24. L. V. 15/30, with plus 0.50, sph. 15/15. P. P.=Snellen 1.5 at 30 cm. With plus 3.25 and 3.75 D. S. for right and left eye, respectively, read smallest Jaeger easily at 33 cm. Fields showed a perfect homonymous quadrant anopsia. There was an entire absence of vision down and out in left field, and down and in in right field. These defects were symmetrical, involving the entire field between the 75th and 180th meridian, up to the median line. In addition the right field was somewhat contracted in its temporal half.

Left fundus showed nothing abnormal except some evidences of arterio-sclerosis (kinking of a vein where crossed by artery, etc.). Right disk showed a peculiar abnormality, probably congenital; the upper two-thirds being much darker than the lower one-third and the two parts were separated by a distinct sharply drawn line. Balance of fundus normal.

A review was given of the work done by Henschen, Wilbrand, Mills, and others, in tracing the visual pathway from the retina to the visual cortex. The latter was believed by most investigators to be in region of the calcarine fissure, but a case reported by Beevor and Collins would seem to show that the cuneus is also part of the visual cortex. The theory of partial decussation of fibers in chiasm, first advanced by Joseph and Carl Wenzel, in 1812, was established by cases

reported by Woinow, Hirschberg, Uhthoff, Schmidt-Rimpler, and Warrington and Dutton. This is contrary to views of Kolliker, Mandlestamm and von Michel, who believe in a total decussation.

Fibers from each quadrant of the retina form separate bundles in nerve, chiasm, tracts, primary centers, presumably in optic radiations, and end in separate centers in region of the calcarine fissure. Research of the literature seems to show that most quadrant anopsias are due to lesion of the cortex. Usual result of lesion in optic nerve is amaurosis; in chiasm bitemporal hemianopsia; in tract and primary centers, *complete* homonymous hemianopsia; and if the lesion is in primary centers, this hemianopsia is usually complicated by hemiplegia and hemianesthesia of the same side by reason of involvement of fibers passing along internal capsule and pedunculus cerebri.

Careful but unsuccessful effort was made to elicit the Wernicke hemianopic pupil inaction symptom. Its absence speaks against the lesion being in tract or primary centers.

Von Monakow, Schmidt-Rimpler and Mills, are all of the opinion that incomplete hemianopsias are due to cortical lesion. Lesions in optic radiations are usually accompanied by symptoms of sensory aphasia, such as alexia, dyslexia and paraphasia. Only symptom in case presented, besides the anopsia, was the hallucinations. These hallucinations are common accompaniment of quadrant anopsias and are probably due to irritation of nonvisual centripetal fibers which, in passing from corpus geniculatum to cortex, intersect the visual fibers.

Usual causes for hemianopsia are hemorrhage, embolism, aneurism, abscesses and tumors. Because of sudden onset and the fact that the man has arterio-sclerosis, the author is inclined to think present case due to small hemorrhage or embolus in region of calcarine fissure.

Discussion.—Dr. John Green, Jr., stated that in this connection the history and ocular findings of a patient with an old head injury, seen recently in consultation, might be of interest. This was not a case of quadrant anopsia, but of symmetrical homonymous defects in the fields.

P. S., age 24, male, single. Ocular examination November 11 and 13, 1907, in consultation with Dr. W. W. Graves.

Ocular History.—Has always been near-sighted; left eye has diverged all his life. States that vision in left eye is much worse than in right, and has always been so.

Examination.—Patient fixes with right eye and has a decided tendency to hold head with chin down and to left. O. S. diverges 15 degrees and turns down a little. Left upper lid droops slightly. In primary position there is constant rotary nystagmus counter-clockwise.

Dextroversion is unrestricted on both sides; the rotary nystagmus increases in amplitude, but not in rate. On levoversion the right eye lags a little, and the rotary nystagmus changes to clockwise. The lagging of the right eye is due apparently to weakness of the right internus and accounts for the position of the patient's head in fixation. On looking up and to the right the rotary nystagmus changes to clockwise. Up and to the left the rotary nystagmus changes to clockwise. On looking straight down nystagmus becomes horizontal, as is the nystagmus down and to the left. Nystagmus down and to right is more marked than nystagmus down and to left. There is less resistance on the left side to passive opening of closed lids.

Left palpebral fissure 8 mm. Distinct weakness of levators on both sides. R=L. Pupils 4.5 mm. Reactions, direct—right prompt, left sluggish. Consensual—right sluggish, left prompt. Right vision 16/50; left vision 16/192. Right with minus 3.5 sph., vision 16/19. O. S. V. not improved by plus or minus spherical or cylinder.

Ophthalmoscope.—The right eye shows a large myopic conus down and out. In the left eye there was a large coloboma of the macular region. The form fields show homonymous sector defects.

Dr. W. W. Graves. The case just reported by Dr. Green probably has but little bearing upon the case reported by Dr. Williamson; but we have reason to assume, in the latter case, the presence of a lesion in the left occipital region, and the incompleteness of the form fields bears this out. Such a thing as a complete homonymous anopsia, due to a cortical lesion, is practically unknown.

The patient is a young man of 24 years, with a healthy parentage and negative family history. He had one epileptic seizure at 12 years of age, followed by a period of seven years' freedom from attack. Then, following an attack of typhoid fever at 19, he began having fits and has had them more or less frequently ever since. He presents a right-sided hemiplegia with a lessened growth of the forearm and hand, and

a slightly lessened growth of the right lower extremity. The mother states that as an infant he was apparently normal, but she noticed at birth that the two sides of the face were not exactly the same, and when he learned to walk he dragged one extremity. We had here an infantile cerebral palsy. Since there was no evidence of any illness, we must assume that it was due to a birth trauma or an antenatal condition. Epilepsy is frequently associated with infantile cerebral palsy, but this child did not develop epilepsy until his twelfth year. When he was about nine years of age he was thrown from a bicycle and was unconscious for several hours and complained of pain in the head for considerable time after that. Then it was noticed that there was a dent in the left occipital region, that his mother had never noticed before. Whether in this case epilepsy was due to the cerebral palsy or to the injury is a question. It will be remembered that the boy was about nineteen when his epilepsy recurred. Epilepsy in cerebral palsy usually occurs in the early periods of life, and there is no reason why it might not develop in this case or even be more apt to do so since he had had the head injury. He has well-developed skull and is intelligent. In the left occipital region at a point about an inch and a half from the middle line is the center of a distinct depression in which you might place your finger tips. It is such a depression as you might expect from a blow over that locality.

What is particularly characteristic of hemianopsia of cortical origin is its incompleteness, and we are justified in assuming that the fall did produce this depression in the skull, and that his visual cortical centers have in some way been interfered with, hence we get a characteristic defect from a cortical involvement of the visual area. We note a striking contrast between these fields, and Dr. Williamson's. A quadrant anopsia, ending at the middle line, is very rare indeed. Such defects are particularly characteristic of lesions involving the optic tract itself or of lesions involving the external geniculate body. Therefore, from the fields alone we would be more inclined to believe that the lesion, whatever its nature may be, is either in the tract itself or in the external geniculate body. It would be very difficult to conceive how a vascular condition, that Dr. Williamson assumes to be the cause of the condition in this patient, would confine itself to the calcarine fissure alone. Assuming that it were an embolism, a thrombus or the burst-

ing of a blood vessel in the calcarine fissure, we would expect to find a defect neither quadrant shaped nor ending abruptly at the middle line. There is no reason why a vascular condition might not just as well occur in the tract itself, or in the external geniculate body. Dr. Williamson has noted neither an increase nor a betterment in this condition, therefore the assumption that it is vascular in origin is probably correct. He has failed to get Wernicke's pupillary reaction. If he could get it, it would be practically confirmatory of the view that the lesion is either in the tract or in the external geniculate body. In lesions of the external geniculate body and in lesions of the optic tract, it is common to find optic atrophy, but anything beyond that does not bring about an optic atrophy. Therefore, I agree with Dr. Williamson, that he has reason to assume a vascular lesion, but I believe that in all probability it is either in the tract itself or in the external geniculate body.

Dr. Williamson stated that his experience with this defect was limited to this case. In the literature he had noted that symmetrical partial defects had been more frequently ascribed to lesions of the cortical center than to lesions of the tract. If the crossed and uncrossed bundles lie separate, how could one hemorrhage produce double destruction of the bundle of fibers?

Ossification of the Eyeball—(Specimens).

Dr. A. Alt. Microscopical sections of the eye, presented at the previous meeting, were shown. This eye is a pathological museum in itself. There is bone formation with marrow, of very large extent, inside the chorioid and ciliary body. The lens is calcareous. In the cornea there are deposits of what for want of a better name we call colloid. The anterior chamber forms a cyst lined with endothelium throughout.

Discussion.—Dr. Williamson asked Dr. Alt whether he could determine where the bone was springing from? Was it true, as Knapp believed, that the bone always sprang from chorioidal tissue?

Dr. Alt stated that the bone was growing around the blood vessels. There were two ways of bone formation, one where the bony tissue seemed to appear as connective tissue, and the other where the lime lies free in the tissue, and gradually ossifies, as exemplified where bone joins cartilage in other parts of the body.

JOHN GREEN, JR., *Secretary.*

BOOK REVIEWS.

Text-Book of Ophthalmology.

BY DR. ERNEST FUCHS, Professor of Ophthalmology in the University of Vienna. Authorized translation from the eleventh revised, and greatly enlarged German edition, with numerous additions, by Alexander Duane, M. D., Surgeon, Ophthalmic and Aural Institute, New York. Published by the J. B. Lippincott Company, Philadelphia and London, 1908. Price, six dollars.

This remarkable text-book has now passed through eleven editions since its first appearance in 1889, three of which have been translated into English. It has, in fact, been a standard authority, occupying a position seldom reached by text-books, and it might be said of it that it is the book on ophthalmology from which many others have been written.

To those who understand German and have had the opportunity of knowing Professor Fuchs and listening to his lectures, the work loses something by translation; it loses that inimitable and non-translatable personality of the author, whose wonderful powers of observation, and clear, concise and simple manner of teaching, have won for him the very first rank of his profession.

The present edition contains eight hundred and seventy-seven pages, and four hundred and forty-one illustrations. The translator has added quite a little material, giving frequently the views of American authorities, and making the work where necessary more complete. Such additions have been placed in brackets and followed by his initial. Dr. Duane has also added a number of illustrations, which are taken mostly from several American works, published within the last few years. Their introduction would seem forced and unnecessary as they add nothing to the value of Prof. Fuchs's book.

Of especial importance is the chapter on Diseases of the Cornea, which covers one hundred pages, and in itself is perhaps the most complete and best monograph which we yet have on this subject.

Another chapter, complete and embodying practically our

full knowledge of the subject, is that on the Disturbances of Motility. Duane has himself added much to this branch of ophthalmology, and while those familiar with his more recent contributions on this subject, might feel that we do not have to import information concerning motor anomalies, it is some satisfaction to feel that American ophthalmologists are perhaps exporting.

The newer pathology of iritis and sympathetic ophthalmia, and revised ideas regarding chorioiditis, glaucoma, and diseases of the optic nerve, represent advances which are well worth consideration.

Diseases of the orbit are covered in twenty-one pages, which would seem to the reviewer to be too great a condensation of a very important subject. A fuller discussion of tumors of the orbit, exophthalmic goitre, and pulsating exophthalmos, would help perfect the balance of a book as broad and comprehensive as the one under review.

The last section pertains to operations. The principles are clearly outlined, and a number of the more important operations are described in detail. The unnecessary inclusion of the innumerable modifications which surround every operative procedure has been dispensed with, and those methods and modifications only which the author from his vast experience has found of value are given.

The publishers have supplied throughout the best to be had in book making, conforming in size and appearance to the other works of their well-known medical series.

Professor Fuchs's Text-book of Ophthalmology is an evolution, and represents the progressive and uninterrupted work of one man for more than twenty years in a field of exceptional activity and resources. It has an individuality which the quickly made and "edited" cyclopedias or systems cannot have, and will accordingly command a more intimate acquaintance, and doubtless prove of greater usefulness.

WILLIAM T. SHOEMAKER.

Diagnostik der Bewegungstoerungen der Augen.

By DR. E. LANDOLT, Paris, published by Wilhelm Engelmann, Leipsic, 1907.

In this little book of ninety-two pages, Dr. Landolt has given the underlying factors and principles pertaining to

disturbances of ocular motility, which enable the observer to more easily approach a diagnosis and place the causation.

Starting with the anatomy of the various muscles, and the physiology of their single and associated actions, the cause of disturbance in a given case is arrived at through the symptoms, in contra-distinction to many text-book methods of teaching by commencing with a disease and finally arriving at the ocular muscle disturbance which belongs to it.

The author has made no attempt to write a complete treatise on the subject, but has endeavored to supply an abbreviated arrangement of important data, of use to the student and practitioner of ophthalmology, in arriving rapidly at a diagnosis. In this he has been very successful, as a little study of the work will show.

Disturbances of ocular motion are considered under four headings, as follows:

I. Paralytic Squint.

II. Concomitant Squint.

III. Association Squint; i. e., squint due to disturbance in the centers governing symmetrical or associated movements.

These cases are quite independent of refraction or visual acuity, or binocular vision.

When the lesion is in the center for symmetrical movements, the patient usually experiences diplopia: spasm of convergence, or paralysis of divergence, giving homonymous diplopia; and paralysis of convergence, or spasm of divergence; crossed diplopia. This is the principal point of difference between the central form of convergent and divergent strabismus, and concomitant strabismus.

IV. Paradoxical disturbances of ocular movement; those due to lack of equilibrium in the acts of binocular vision, projection, etc. They are characterized by incoherence. For example, when one eye is turned outward, the other turns upward, or when directed to look upward, a patient so affected may turn one eye upward and the other downward.

Nystagmus belongs under this class.

The location and causes of motor disturbance are then considered for the individual and associate muscles, and finally the character of disease and the special diseases

which give rise to paralysis and spasm of the ocular muscles.

A well arranged table or chart showing the characteristics covering involvement of the six individual muscles, and twenty-three figures in the text, well fulfil their purpose.

The book will prove very useful to those for whom it is intended, and it is to be hoped that it will before long find its way into English, and thus be of still greater usefulness.

WILLIAM T. SHOEMAKER.

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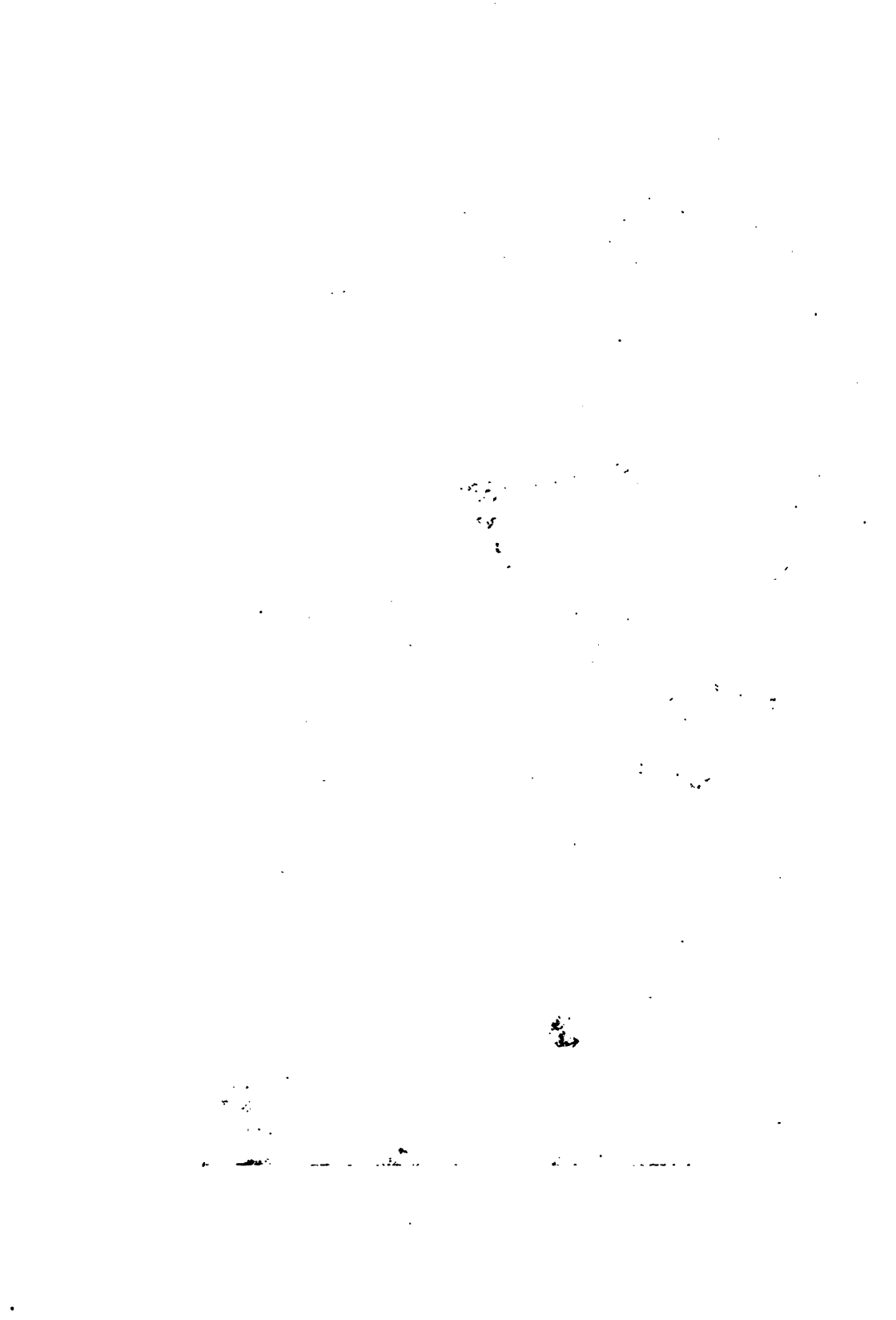
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THE STUDY OF REFRACTION.

MATTHIAS LANCKTON FOSTER, M. D.,

NEW YORK.

As we follow the mutations in the medical world we feel impelled sometimes to exclaim in the words of the dying King Arthur, "The old order changeth, yielding place to new," and sometimes we realize that "we stand at the parting of the ways," where progress demands that we follow a course at variance with the one we have hitherto trodden, and press forward therein to the more or less complete abandonment or alteration of our methods and habits. But this cannot be said to happen when we read the superabundant, contradictory writings on the subject of refraction. They are more apt to weary us and impel us to cry

"O wad some Pow'r the giftie gie us
To see ourselfs as others see us!
It wad frae monie a blunder free us
And foolish notion."

You may be pardoned if you ask what reason I can present for adding another to the unnumbered multitude of these writings. You may think, when I have finished, that I am actuated by a spirit of cynicism, and can furnish no good reason for adding to your burdens, but I believe I have ideas which, if I can communicate them to you, may be of value. Some writer has said that man is a triple personality, that he is such as he thinks himself to be, such as

other men think him to be, and such as God knows him to be. So the value of this thought of mine is as I think it to be, as you may judge it to be, and as the future will prove it to be.

From a study of our contradictory literature, we learn that the principal source of dissension among those who are accustomed to try to correct errors of refraction is the question of the routine use of cycloplegics. First we read a screed denunciatory of all who attempt to determine the refractive condition of an eye without the profound interference with the physiological condition and function of that organ produced by an efficient cycloplegic, like atropine. To quote such a writer, "There are many oculists, but few refractionists." "No cycloplegia, no refraction." Another writer tells us that a mydriatic which is not always an efficient cycloplegic, homatropine hydrobromate, is a *sine qua non* for refraction work. Another writer gives us "eighty different sources of error in refraction work, eighty causes 'why glasses failed to cure'". One of these sources of error is that no cycloplegic was used, another that the wrong cycloplegic was used, and the author intimates distinctly that any cycloplegic except the mixture of homatropine and cocaine in the proportion in which he is accustomed to use it is a wrong cycloplegic. Another condemns the routine use of any cycloplegic or mydriatic in refraction work as misleading and tending to error. Then we read that all the ills of earth are dependent on muscular imbalance, then that cases of muscular imbalance which demand treatment are medical curiosities. Worst of all, each writer repeats what has been said before, repeats, repeats, *ad infinitum*, *ad nauseam*. These writers have no trouble in proving each other wrong and in raising the question whether there exists in this wide world a man who understands how to fit glasses. This doubt is brought out very strongly by the writer who finds so many reasons why glasses fail to cure when he asserts that the same patient sent to twenty-five oculists would receive twenty-five different forms of treatment. I do not want to let that statement pass unchallenged. I do not believe it. Possibly it may be true in the city in which he lives, the city which he says has a monopoly of the proper teaching of refraction, but I am positive it is not true here in New York. We may

not know how to teach properly, we certainly do not know how to teach twenty-five ways of investigating refraction, all wrong.

In one point all writers agree, that in certain cases the use of a cycloplegic, atropine, is necessary, the disagreement is with regard to its routine use. This disagreement must be due to faulty observation on the part of the majority, perhaps of all, and the question arises whether it may not be the result of too little attention to the effect produced by a physiological factor which modifies the mechanically optical condition of the eye. It is not safe to assume that the advocate of any one routine procedure has had no experience with any other, but it is pretty certain to be true that the wider a writer's experience with different methods the less "cock-sure" he will be concerning the correctness of his own opinion. In the hospital with which I have been so long connected I have seen a complete circle traced with regard to cycloplegia in refraction work. When I began this study in Dr. Pomeroy's clinic, back in the '80s, the custom was to place all non-presbyopic patients under the influence of atropine, but just about the time I joined the clinic it was becoming evident to those who had been longer in the work that many patients could be refracted just as accurately without atropine. This number was constantly found to be larger and the routine use of atropine died out among us. Some writers seem to think that the abandonment of cycloplegia at this time was caused by the introduction of the ophthalmometer, but so far as we were concerned such was not the case. At the time to which I refer the ophthalmometer was little more than a curiosity and was not used in the clinic. At the same time we were experimenting with retinoscopy, which we found to be a delusion and a snare without cycloplegia. But it did seem an extravagance to deprive the eyes of their functions for from ten days to two weeks in order to secure an examination of brief duration and uncertain need, and a demand arose for an evanescent cycloplegic, one which would quickly paralyze the ciliary body, permit the examination and then allow the eye to regain its functional activity with a small loss of time. This demand was responded to by homatropine, scopolamine and other similar drugs. Did I use them? I certainly did. In 1896 I placed on record my views, at

that time favorable, concerning the action of homatropine. I likewise reported in 1896 a case in which scopolamine proved dangerous. Do I use them now? I certainly do not. Wider experience taught me that in a large percentage of cases the ciliary muscle is stimulated instead of paralyzed by a 3 per cent. solution of homatropine, whether used alone or in combination with any proportion of cocaine, so that a hypermetropic astigmatism appears to become changed to a myopic astigmatism, that myopia may be simulated, and that the amount of astigmatism may be temporarily altered by the drug, while in only one single case in which cycloplegia was really needed do my records show that I succeeded in obtaining paralysis of the ciliary muscle. If inefficient as a cycloplegic when needed, and misleading in certain other cases by causing spasm of the ciliary muscle, homatropine was not a drug to suit me and I dropped it. A recent investigation of homatropine by a careful observer, Dr. Duane, revealed a much smaller proportion of failures to produce cycloplegia than that shown by my cases, but failures were there, and whether the proportion is larger or smaller the drug remains unreliable. Scopolamine I have used rarely since my alarming experience with it. Homatropine and scopolamine were, and still are, used in the clinic to which I have referred, and now the younger men seem to exhibit some tendency to revert to the routine use of atropine, the same that obtained when I began the study of refraction. Thus the circle is complete. How much have we advanced? We have learned to recognize the influence exerted by low degrees of astigmatism and hypermetropia on certain nervous symptoms, such as headache, and this has been an indirect aid to the attainment of accuracy in refraction work by making its need evident. We have perhaps perfected retinoscopy and ophthalmometry, but neither gives accuracy in the correction of refractive errors of the eye. Retinoscopy would give such accuracy if the eye were simply a mechanical camera, but as it is something more, a physiologically active organ, a margin of error must appertain to the retinoscopic findings which corresponds to the physiological activity of the individual eye. Both ophthalmometry and retinoscopy are guides, excellent ones, well worth perfecting, but after all not absolutely accurate in

final results, because they can furnish information concerning the mechanical condition present, and that alone. Do not misunderstand me. A thorough knowledge of the mechanical conditions present is essential to good work, and when it is necessary in order to ascertain these conditions, cycloplegia must be employed. My case books show that I use atropine in a considerable proportion of all the cases of refraction that consult me, in order that I may ascertain that condition. But we should remember that cycloplegia is a physiologically and functionally abnormal state which must be wholly recovered from before we can fit glasses to an eye in the state of normal activity in which it is expected to be used.

It is evident that the various writers in contemporaneous literature to whom I have referred cling to the various portions of the circle I have traced, that each feels that he has reached, if not the Ultima Thule, a very close approach thereto, and that each wonders at the blindness or prejudice of his fellows who do not agree with him. There must be a reason for the complacency of each toward his own methods and for his half pitying contempt for those of others. I incline to impute as the reason the pleasant things we each hear in our consulting rooms, combined with the wonderful tolerance of most eyes. The great majority of persons fitted with glasses by itinerant spectacle vendors, by advertising opticians who know nothing of the organ they treat, by physicians who use homatropine as a routine measure, by physicians who use atropine in the same way, and by physicians who use neither as a rule, wear the glasses so obtained with comfort, while a minority of each class seek relief elsewhere. Then the physician who does not usually find need of help from drugs in refraction work is consulted by one who says, "Behold, I consulted thy brother, who did put drops in my eyes, cause me to lose valuable days of work, cause me pain and dazzling, all of which I bore willingly, that I might get relief from the troubles on account of which I sought him. He has prescribed glasses, but I cannot wear them. My sufferings are worse instead of better. Canst thou help me?" An over or under correction of astigmatism, or hypermetropia, is found, the glasses changed, the physician listens to songs

of praises addressed to him, pats himself on the back and says, "Go to, thou cycloplegist, I can fit glasses better than thou canst. Do not thy patients come to me for relief from the ills thou makest them suffer?" But he does not know that at the same moment the cycloplegist is listening to similar songs of praise, feeling the same sense of superiority for similar reasons and saying, "My brother who uses not atropine and the retinoscope as a routine procedure is no better than an ignorant optician, he is no refractionist." Little does either of them dream that another physician who relies on a mydriasis produced by a mixture of homatropine and cocaine is busy explaining why glasses prescribed by them both have failed to cure, and still less does the latter imagine that some of his patients after five, six or more visits have left him and the city in which alone refraction can be properly taught, and successfully sought the relief he failed to give at the hands of a refractionist who used no drops, but examined the eyes in the condition in which Nature intended them to be used.

Two things stand out clearly from this testimony of patients, first that success in giving comfort with glasses is attained in some cases by the rule of thumb methods of the spectacle vendor, by the physician who renders the organ functionally incompetent, by the physician who finds muscular errors in every case, by him who finds such errors in none, and by the physician who examines the eye in its physiologically and functionally active state; second, that in other cases each and every one of these fail to give relief. This testimony that we are all right and at the same time all wrong is true in so far as it shows that no one of us has a monopoly of right or wrong.

Are not these facts suggestive? Do they not indicate that progress cannot be made by traveling round and round in the circle I have indicated? Must we not get away from the question of cycloplegia or no cycloplegia to find the explanation of the failures of careful, earnest, educated physicians?

We know when we stop to think of it that most eyes are very tolerant. Most people have demonstrable errors of refraction of which they are unconscious. Most people who become conscious of those errors and wear glasses to correct them remain comfortable when the frames are bent,

a spherical tilted so as to produce an astigmatic correction, or the axis of a cylindric altered 5, 10 or 15 degrees. Such persons obtain satisfaction from any and every method, as is to be expected from their tolerance. A comparatively few eyes are intolerant to even a very slight error of refraction, or a slight variation of the correcting lens from its proper position, but these comparatively few form the class from which most if not all ophthalmologists draw their failures, and it may be remarked in passing that we know very little with regard to our own failures. I know yours and you know mine, for our patients do not as a rule return to tell us what stupid blunders we make, they tell that to the new doctor, at least such is my inference from the tales with which I am regaled. When we succeed in fitting a member of this class to his or her satisfaction it has been because we recognized, or chance to make the proper allowance for, the physiological tension of the muscular tissues in the eye when in a state of normal activity, and so far as we deserve any credit for the result, it is because we have exercised our brains to ascertain to what extent the characteristics of a mechanical camera have been modified by the physiological activity of the contents of that individual eye. Study of such physiological activity sometimes reveals surprises. I recall a woman of forty, who had a full dioptré of manifest hypermetropia, accepted it readily on test, but could not wear with comfort over half a dioptré of correction. I have seen a presbyope of forty-five in perfect comfort when she wore her constant correction for hypermetropia, but suffer from intense headache whenever she attempted to wear any correction for her presbyopia, although without such a correction she had to hold a paper at a distance of about twenty inches when she wanted to read. In neither of these cases did I find an explanatory muscular imbalance. I have relieved the suffering of patients who have come to me wearing glasses that to the best of my judgment corrected their refractive errors with mathematical accuracy, by a change in the strength of the correcting lenses, making them weaker in some cases, stronger in others, whether spherical or cylindric, or by changing the axis of a cylindric correction a few degrees. I have seen an apparent myopia persist in spite of the constant use of

atropine from June till September in the eyes of a young man, and then pass off. In this case I could detect no muscular error. I have seen a myopia similarly persistent in spite of the use of atropine in the eyes of a young man who had $\frac{2}{3}$ or $\frac{3}{4}$ of a degree of hyperphoria, and have seen it disappear after I had performed a partial tenotomy on his superior rectus in the hope of stopping his headaches, although no change in the muscular condition could be detected two weeks after the operation. These were cases of spasm of the accommodation, the causes of which I do not know; the evidence is too insufficient and faulty to enable any careful observer to ascribe either to faults of the extrinsic muscles. I have seen the corneal astigmatism change while I watched it with the ophthalmometer. I have the record of a patient who sought relief in this country and Europe for seven years and handed me copies of successive prescriptions which proved that her astigmatism had gradually increased during that time from 1.50 D. to 4.50 D. I have seen a patient whose muscles were so developed that she could simulate 16 degrees of exophoria or esophoria at will. Years ago, while studying the effects of prisms on my own eyes, I developed a hyperphoria which necessitated my wearing a 5 degree prism base down over my right eye for a year and a half, a condition that passed away long ago, but is frequently held to be a positive, imperative indication for surgical treatment. But these examples suffice for my purpose, which is to draw attention to the fact that while a perfect knowledge of the mathematical foundation of refraction and of optics is necessary, while the use of drugs is necessary in a large percentage of cases to enable an examiner to determine the actual mathematical condition of an eye, an absolute adherence to mathematical, mechanical standards to the neglect of the modifications produced by physiological activity is wrong in dealing with the eye, whether we are considering the action of the intrinsic or of the extrinsic muscles. Such an adherence is practicable only in eyes which are naturally tolerant, in intolerant eyes an allowance must be made for the variation of the normal condition of the eyes from the mathematical standard induced by a factor I cannot define, but which seems to be inherent in the life of the tissue. I

grant that many cases of asthenopia, after glasses have been correctly fitted are of psychic origin, many are cases of reflex irritation from nasal troubles, some from troubles of various internal organs, and that in these no help is to be expected from glasses. I have no method to suggest. Each of my cases has had to be studied separately, and my findings point to no common factor on which to base a system. I do not know that any additional system of examination is needed or advisable. What I plead for is a more thorough study of the eyes of our patients and of the influences which bear upon their refraction, for less positiveness and more observation and thought, and for an attempt to learn a more perfect method of fitting these intolerant eyes through a more perfect knowledge of their physiology.

616 Madison Ave.

THE PRINCIPLES ON WHICH IS BASED MY OPERATION FOR CICATRICIAL ECTROPIUM OF THE LOWER LID.

F. C. Horz, M. D.,

CHICAGO.

What holds the border of the lower lid in apposition to the eyeball, and what prevents under normal conditions the lid from being dragged down by the cheek?

These questions are of fundamental interest in the operation for ectropium; for if we fully and clearly understand the anatomic conditions which sustain the lid in its position, we shall naturally come to the conclusion that our attempt at relieving an ectropium of the lower lid promises the best and most lasting result if we restore as nearly as possible the anatomic conditions of the normal lid.

The border of the lower lid is firmly fastened to the orbital margin at the inner and outer canthi; it snugly adapts itself to the eyeball, and is held in this position chiefly by the elastic tension of its fibres. The insignificant tarsus can obviously give no support to the lid; and that the orbicularis muscle does not materially contribute to it, is proven by the fact that the paralysis of this muscle causes but very little eversion of the lid border, while the loss of its elastic tension, as we often find in old people, causes a marked eversion (senile ectropium), although the function of the orbicularis muscle is not affected. This fact is well recognized, as we see that the aim of all the modern operations for senile ectropium is the shortening of the lid border in order to restore its tension.

But in cicatricial ectropium this tightening of the border constitutes but a minor part of the operation. Here we have to deal with a far more complex problem than the mere eversion of the lid border; here the whole lid is dragged from its place and its anatomic structure is more or less altered, and what I regard as the most serious damage, the anatomic relations between lid and cheek are entirely wiped out. Measures therefore must be taken to put

the displaced lid back to its proper place, and provision must be made to maintain it in its position by reconstructing the anatomic conditions and relations of the normal lid.

The history of the various operations for cicatricial ectropium of the lower lid tells us that the result of the operation very often has been only of a very short duration; that the ectropium soon returned, and that this recurrence could always be traced to traction which proceeded from the cheek to the lid. It is obvious then that no matter how we repair the lid, and what material we use for replenishing its lost skin, the most important provision we must make in all cases is to guard the replaced lid against this noxious traction from the cheek. The whole success of our operation hinges on the elimination of this traction. How can we do it? It seems to me the most rational way is to adopt the plan by which nature safeguards the normal lid in its position. The lid is so mobile that the slightest traction suffices to evert it if the finger is placed upon the lid skin above the infraorbital margin. We all execute this manipulation if we want to evert the lid. But if we place our finger below the infraorbital margin upon the cheek, no amount of pulling disturbs the position of the lid, because the mass of the cheek is so firmly attached to the infraorbital margin that it cannot sag down by its own gravity to exert any traction upon the lid, and its integument though apparently contiguous with the skin of the lid, is so well controlled by this fixation to the infraorbital margin, that any traction exerted upon the cheek is arrested at this point. This fixation of the cheek constitutes a barrier which absolutely prohibits any traction force from passing upwards beyond the infraorbital margin; consequently it cannot reach and affect the lid.

This protective barrier which had been destroyed by the loss of tissues which led to the ectropium must be reconstructed. In the operations generally employed, no provision is made for the reconstruction of this barrier. After the lid has been liberated from the cheek and is replaced, the resulting wound below the lid is closed either by sliding the adjoining skin over it, or by transplanting a skin flap, or by implanting Wolff or Thiersch grafts; these flaps are attached by their upper margin to the lid and by their lower margin to the cheek, and any traction exerted by

the cheek or by the shrinkage of the transplanted flaps acts directly upon the lid and pulls it from its position. Hence the frequent recurrence of the ectropium after these operations.

But these failures can be reduced to a minimum and at the same time the cosmetic result can be materially improved if we incorporate into our operation the principles I have enunciated above, to-wit: That the operation for cicatricial ectropium of the lower lid must re-establish the anatomic relations between lid and cheek, and must also reconstruct the barrier which shall protect the lid against any traction from below. The first principle demands that the repairing of the skin of the lid and cheek shall be done



Figure 1.

by two separate flaps, one flap to replace the skin of the lid, and a separate flap to cover the wound area of the cheek; and the second principle demands that these two flaps shall join each other along the infraorbital margin and be firmly anchored there.

These principles constitute the main features of the operation I introduced in 1903.* It is carried out in the following manner: Whenever it is possible—and in the most cases it is possible—I utilize the cicatricial skin which usually extends from the everted lid more or less far into the cheek as the material for replacing the lost skin of the lid. I cut a large semilunar flap (fgb, Fig. 1), which in

*Archives of Ophthalmology, Vol. xxxii.

connection with the lid border is dissected up and mobilized until the lid can be placed in its normal position. The next step is to reduce the overstretched border to the proper length by removing a suitable piece (abcd, Fig. 1) at the outer canthus. This done, the margin of the lid flap is fastened by numerous fine sutures to the tarso-orbital fascia just above the infraorbital margin. Finally the lid margin is drawn up as far as possible and held in this position by two ligatures fastened to the forehead by plaster strips (Fig. 2). This is done to keep the lid flap as immobile as possible for two or three days. The wound area below the

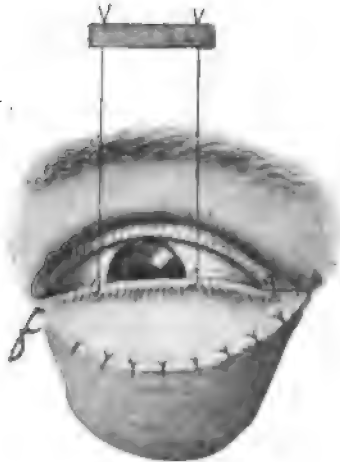


Figure 2.

lid is covered by a separate flap for which I prefer a Thiersch flap cut from the skin of the arm.

If cicatricial skin should not be available, and other material (Wolff or Thiersch flaps) has to be used to replace the lid skin, these flaps must be treated on the same principles, that is to say, we must take two flaps, one for the lid and one for the cheek; and the lid flap must be sutured to the lid border on the one side, and to the tarso-orbital fascia on the other side. Under all circumstances must the distinction between the skin of the lid and cheek be observed and their boundary be marked by the fixation to the infraorbital margin by means of the tarso-orbital fascia.

This operation has given me great satisfaction; the re-

sults were uniformly good and in all cases which I had the opportunity to examine after three months or later there was no sign or tendency of recurrence of the ectropium. Indeed I found the lid improved with age, its appearance becoming more perfect the more time had elapsed since the operation. I do not wish to encumber this paper with a long report of cases; one case may suffice to show what can be accomplished. I have selected this case because the



Figure 3.

picture was taken one year after the operation and therefore can be accepted as representing the final result.

The patient was a victim in that terrible theatre fire in Chicago December 30, 1903. She escaped alive, but with the left side of her face horribly burnt, causing a distortion of the nose and mouth and a complete ectropium of the lower lid of the left eye. In the spring of 1904 an operation was performed, evidently consisting of a tarsorrhaphy and skin grafting; this operation was a complete failure,

as the implanted skin flaps attached to the lid and cheek would pull the lid down by their shrinkage. In December, 1904, the patient came to me presenting the following condition (Fig. 3): Complete ectropium of the lower lid, a few horizontal cicatricial ridges below the lid margin as the remnants of the grafts, and a union of the lid margins at the outer canthus, indicated in the picture by a plain black line. On the 17th of January, 1905, I performed my opera-



Figure 4

tion on this lid; the healing was uneventful and the picture (Fig. 4) taken in January, 1906, shows the result which certainly we may regard as permanent. The position of the lid is perfect, the color of its skin does not differ from that of the cheek and it would also be perfectly smooth but for the roughness produced by the shrunken grafts of the first operation. Even the movements of the lid are restored so that when the lady smiles it shows the same cunning wrinkles as the right lower lid.

Venetian Building.

A SUGGESTION AS TO THE TREATMENT OF SYMPATHETIC IRIDO-CYCLITIS. PATHOLOGY OF THE UVEA OR TRACTUS UVEALIS.

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The iris and the ciliary body, for their richness in blood-vessels and repeated anastomoses, bear some analogy with the placenta, the whole eye depending as much upon them for its nourishment, as the fetus depends upon the placenta. The abundance of blood which the iris and ciliary body must contain, in order to provide for the nourishment of the eye, increased still more by the effort of accommodation they are constantly submitted to, is accountable for the great tendency of this part of the uvea to become inflamed.

When both iris and ciliary body become seriously inflamed in consequence of a sympathetic irido-cyclitis, the exudate poured out by these tissues finds its way:

(1) Into the anterior chamber.—Here, part of the exudate is suspended in the aqueous, part is deposited as a fine layer upon the walls of the anterior chamber, and part sinks to the bottom to form there a hypopion.

If the exudate in front of the pupil becomes organized into a membrane, (pupillary membrane) the pupil will be closed—Occlusio pupillae.

(2) Into the posterior chamber.—The exudate here may cause either an anular adhesion between the capsule of the lens and the pupillary margin of the iris which shuts off the aqueous of the anterior from the posterior chamber. (Seclusio pupillae) or an adhesion of the whole posterior surface of the iris to the anterior capsule of the lens with obliteration of the posterior chamber—(Total posterior synechia).

The exudate, besides filling the whole posterior chamber, is also freely deposited in the Petit's canal and upon the surface of the ciliary processes. From here it may find its way to the back of the lens which is thus enveloped, all

around, by a thick infiltration of the exudate connecting to the sides with the ciliary body. When the lens, in consequence of this, starts to shrink, the whole ciliary body may be drawn out of its place.

(3) In the-stroma of both iris and ciliary body.

(4) In the vitreous.

These changes and the inevitable increase of tension consequent upon them, will inevitably lead to blindness; but should any sight at all be left after the first attack of inflammation is over, this too will be destroyed by fresh attacks of inflammation caused by the constant pulling on both iris and ciliary body, consequent upon the shrinkage of the exudate, and the natural effort of accommodation, as soon as the eye is exposed to the light.

Against this, our treatment nowadays consists in the instillation of atropin to prevent adhesion between the iris and the lens. The fact is that the iris, on account of its infiltration, does not draw to the side, and when it does, more harm than good is sure to follow, since the ciliary body will have to take up the blood which finds no lodgment in the iris (Fuchs), not to speak of the glaucomatous complications brought about by the atropin. No wonder that with such a treatment the result of sympathetic inflammation is an inevitable total blindness.

According to the Science of Ophthalmology, sympathetic inflammation is a sort of *noli me tangere*, the specialist is not allowed to interfere with, and atropin constitutes, as I said, the whole treatment of this complaint. In my opinion this is too little indeed in a case where anything can be attempted, because nothing can be worse than total blindness.

The general surgeon has realized wonders since he has started to dare; why should not the ophthalmic surgeon dare, too? Is not the eye part of the body? In my opinion, sympathetic inflammation should be viewed in the same light as all suppurating inflammations of the body are viewed by modern surgery, and treated likewise.

My treatment will be on this line, and will consist in:

REST—BLOOD-LETTING—ELIMINATION OF THE PUS.

REST.—This is best accomplished by removing the lens. Its removal suppresses the accommodation forever, and the

ciliary body is thus allowed the benefit of absolute rest. Besides, the lens depends on the ciliary processes for its nourishment, and its removal will relieve them of so much work; but there is one more reason for it: it suppresses the canal of Petit where the exudate, being shut off from the stream of the aqueous, is sure to become organized into membranes.

BLEEDING.—A very large iridectomy will permanently relieve congestion of the ciliary body. This membrane, the iris, with its large surfaces, is mainly responsible for so much exudate being poured into the cavity of the eye, and is also responsible for the existence of those two small spaces, the posterior chamber and the pupil, where the exudate shows a great tendency to become organized. The more of the iris removed, the better, as the ciliary body needs effectively to be relieved of its congestion.

ELIMINATION OF THE PUS.—The fine meshwork of the ligamentum pectinatum, through which the liquids of the eye are filtered into the subjacent Schlemm's canal, in all cases of sympathetic inflammation is blocked,—

(1) By the fine layer of exudate which lines the walls of the anterior chamber.

(2) By the fulness of the iris due to the infiltration of its stroma.

(3) By the periphery of the iris being pushed against it in all cases of *occlusio* and *seclusio pupillae*.

(4) By the reckless use of atropin.

If the canal of Schlemm is now laid open with an incision through the sclera, and practically the whole iris is cut off at its periphery, the filtration of the liquids will be restored to normal. Then the anterior and posterior chamber, Petit's canal, and also the spaces formerly occupied by the iris and the lens will be converted into one large cavity wherein the exudate of the ciliary processes floats, in almost twice as much the normal quantity of aqueous. What will become of this exudate? Within the cavity nothing is to be found that might favor its tendency to gather into membranes, no iris to rest upon, no small cavities such as the posterior chamber and Petit's canal in which to become organized, nothing but aqueous. Under the circumstances, it is but reasonable to suppose that the exudate will be, so to speak, washed away by the aqueous through the wide

open Schlemm's canal; but should part of it sink to the bottom of the cavity and form there a hypopion, this too could easily be removed with an incision which may be used as a drainage in the after-treatment.

If treated in this way, i. e., as an ordinary suppurating cavity, the inflammation may gradually spend itself, leaving a fair amount of sight, as in the case I will report below. Of course, this treatment, to be of use, should be resorted to when the earliest symptoms of sympathetic inflammation appear, although in some cases it may be tried even at a later period.

Tattooing of the cornea, I presume, cannot be dispensed with at the end of some months.

SUMMING UP: I suggest that practically the whole iris be cut away, because its suppression,—

(1) Reduces the amount of exudate.

(2) Depletes the ciliary body.

(3) Lays open Schlemm's canal all around the sclero-corneal junction.

(4) Does away with small cavities, such as the pupil and the posterior chamber, where the exudate finds favorable conditions to become organized.

(5) Increases the amount of the aqueous which is so useful to wash the exudate away.

The lens, also, should come out because its removal,—

(1) Eliminates all effort of accommodation then and thereafter.

(2) Suppresses Petit's canal, another small cavity where the exudate is sure to become organized.

(3) Brings into communication with the new large cavity those ciliary processes which otherwise would discharge their exudate into the cavity of the vitreous.

(4) Increases the amount of aqueous which is so useful to wash the exudate away.

The plan to be followed is rather a matter of personal taste, mine would be this:

FIRST DAY.—Iridectomy: with a Graefe's knife, the incision is carried all along the sclero-corneal junction, from side to side, more on the sclera than on the cornea, leaving a bridge of tissue at the top and bottom of the eye. The iris is cut all along this incision close to its base, leaving a bit of it (if it is not possible to remove it all) at the top

and bottom of the eye. Needling of the lens, or better still, disintegration of its elements by pressing the cornea against the lens, either directly by the means of a spoon, or indirectly, through the upper lid with the thumb.

NEXT DAY.—Removal of the capsule and suction of the milkish lenticular mass, followed by a thorough washing of the cavity then and after, if required.

All the work may also be carried out at one time, if so desired. Internal and external medical treatment to suit the case.

CASE.—N. N., a female, met with an accident in the right eye. Six weeks after the accident she came under my care. There was no sight in the right eye, the iris was incarcerated in two places, a thick membrane was obstructing the pupil, and a dirty yellowish color of the sclera testified to the deep suffering of the tractus uvealis.

There was cataract in the left eye, and I was asked to remove it to give the poor patient sight.

Now, to interfere with an eye at a time when sympathetic inflammation may be incubating, is more than any thoughtful man would dare to do without thinking of it twice. And I thought of it for two days. I kept this patient under observation, but I could detect nothing that might warrant a diagnosis of sympathetic inflammation, except a little sensibility at the top of the eyeball, and a slight pericorneal injection hardly worth mentioning. Other symptoms, if present, were masked by the cataract and might be suspected, not detected.

I was hesitating, but my hesitation could not last long, since I had already planned in my mind what course to take. My plan was to operate at once; should sympathetic inflammation be present, the operation might get the best of it, and if not, well, my patient would be no worse after the operation than she was before.

I explained to the patient that no good and much harm might come by waiting, and she agreed to everything I said.

I always use Kalt's method in my cataract operations, i. e., I apply a silk suture before making the sclero-corneal incision.

I find it also useful to remove the capsule soon after the incision is made, and to cut the iris (only when it is necessary) after the lens is out and the wound is closed.

In the present case, the application of the suture, the incision, the removal of the capsule and that of the lens, all went on well, but no sooner was the lens out than the eye became conic shaped, and so congested that I could clearly see the large blood-vessels of the conjunctiva, and the smaller ones of the tissues underneath, running in a radial direction, from the sclero-corneal junction to the back of the eye. The vitreous might escape at any moment, but on pulling upon the thread, the wound closed and the whole eye resumed its normal shape. The prolapsing iris was then cut at each side of the suture close to the incision, a good half of this membrane thus removed, leaving a very large black pupil.

The enormous congestion of the eye as soon as the lens was cut, i. e., when the intraocular tension became considerably low, made it clear to me that sympathetic inflammation was already present; so I waited with anxiety and curiosity to see what bearing my operation would have upon it.

After three or four days of comparative rest, the symptoms of sympathetic inflammation asserted themselves in a frightful manner. Most serious of all was the injection. This was deep in character and extended uniformly to the back of the eye, as if the whole tractus uvealis were equally affected, and the chorioid and the ciliary body as well.

The next symptom in severity was the lacrimation which was profuse, and disappeared only after several months had elapsed.

The third symptom was photophobia, but this symptom never attained such a high degree of severity as either the injection or lacrimation.

Whether there was any exudation in the anterior chamber or not I could not say, the photophobia and lacrimation preventing a proper examination; but as far as I could see there was none except a few dots on the cornea, but no hypopion.

The ugly look of the eye is what impressed me most unfavorably, so unfavorably, indeed, that after a few weeks—three or four—I gave up both hope and treatment. Despairing of any good, I discontinued visiting this poor patient, and told her relatives that whatever sight there might be in the eye, would be lost within a short time.

At the end of three months, this patient came to me again, and I was not a little surprised to see that there was good vision in the eye operated upon. The congestion was not much, yet both congestion and lacrimation were easily excited by the least effort to look at something. There was still that ugly appearance about the eye which had impressed me so unfavorably from the start, so I did not feel like changing my opinion as to the ultimate result of the inflammation. I prescribed glasses and told the patient to report from time to time.

Three months later I saw her again, and this time I could get a good view of the fundus; this was normal; vision was one-half; congestion, lacrimation and photophobia, almost none, yet it was evident that the eye was undergoing some change.

To-day, eighteen months after the operation, the condition of both eyes is as follows:

Right Eye.—The yellowish dirty color of the sclera is more accentuated, and reminds me of a leaf off a tree. A secondary cataract is filling the pupil. No sight.

Left Eye.—This eye, which was white and clear at the time of the operation, now, too, is yellowish and ugly looking, yet not so much as its fellow. A previous small gerontoxon at the top now occupies fully one-third of the cornea, and seems to be advancing; the pupil is large and black, the anterior chamber deep and free from exudate; with $+ 8$. D. S. $\subset + 1$. D. C. 180, V. $\frac{1}{2}$.

When the inflammation affects more the anterior than the posterior portion of the tractus uvealis, the removal of both iris and lens should afford still better result.

In reporting this case in support of my suggestion as to the treatment of sympathetic inflammation, I have only one desire: that my suggestion be applied without timidity, and that a copy of everything that will be said or printed pro and con, be sent to me. I know that time only will show whether my suggestion will be of use in the treatment of sympathetic inflammation and other irido-cyclitis, traumatic or otherwise, not amenable to medical treatment.

A CASE OF SARCOMA OF THE RIGHT ORBIT.

HENRY MUETZE, M. D.,

ST. LOUIS, MO.

This case, which I presented to the Society at our last December meeting, and of which I submit a more detailed report to you this evening, was referred to me September 11, 1907, with the following history:

The patient, a stout, healthy looking boy, thirteen years of age, has never passed through any serious illness in his life. Last June, while playing base ball, he was struck by a ball on the right side of the nose and corner of the right eye. The nose bled a little at the time, but this soon stopped and the boy resumed his play. Several weeks afterwards the right eye began to water and a little swelling appeared at the inner canthus. As there was no pain, the mother of the patient did not consider the trouble seriously, and not until the tumor had attained a considerable size, did she consult the family physician, who referred the case to me for examination. When I first saw the patient, there was quite a large tumor, extending from the inner part of the roof of the right orbit down to the wing of the nose, and from the root of the nose to the inner canthus, encroaching considerably on the eyeball, as shown in photograph No. 1. The growth felt soft and doughy to the touch—aspiration proved negative. Removal of the tumor was decided upon and performed under ether anesthesia September 29, 1907. After the usual preparations, a straight incision was made through the skin from the inner part of the right supraorbital ridge to the wing of the nose. I had no difficulty in dissecting out the growth, which was enclosed in a connective tissue capsule, until I reached the superior posterior part of it. This was firmly attached to the bone, and in the attempt of removing it, by means of a chisel, it broke. After scraping the bone thoroughly, the wound was closed by sutures. The tumor, a mass of very soft consistency, was taken in charge by the anesthetist, who volunteered to send it to Dr. E. F. Tiedemann, the patholo-

gist, for microscopic examination. Unfortunately it was lost.

The wound healed by first intention, and I began to congratulate myself upon the good result, when one day the patient stated, that his right eye had watered at times since a few days. Upon examination I found in the region of the lacrimal fossa a hard kernel about the size of a navy-bean, which resembled a dilated tear sac with thickened walls. No fluid escaped, however, from either punctum on pressure. I sounded the canal several times, which procedure



Figure 1.

was both difficult and painful, but in spite of my efforts, the swelling grew larger. Very soon another swelling appeared at the upper inner part of the orbit, became confluent with the lower one and began to creep over the nose to the inner canthus of the left eye. I then concluded, that the tumor must be a recurrence of the first growth and possibly malignant in character. A second operation was performed on the patient under chloroform anesthesia January 9, 1908, in presence of Dr. E. F. Tiedemann, in order to insure complete removal of the neoplasm. The tumor presented the configuration, as shown in photographs Nos. 2 and 2-a. After shaving the eye-brows and preparing the parts in the

customary manner, a vertical incision was made through the skin midway between the eye-brows, carried down to the nose, almost on a level with the inner canthus, then brought over on the cheek, up and along the margin of the lower lid, completely encircling the tumor, and terminating in the vertical incision on the nose. Another incision was made at a right angle to the vertical incision and carried to the inner canthus of the left eye. After dissecting out the lower part of the tumor with the skin, the flaps a, b, and c, were taken up. Extending from the upper and inner



Figure 2.



Figure 2a

part of the orbit across the bridge of the nose to the inner canthus of the left eye, the tumor was found to be closely connected with the bone-substance, and it required some force to remove it with the chisel.

After thorough inspection of the wound by Dr. Tiedemann, the greater part of the wound was closed by skin flaps, leaving a space about the size of a dime, between the inner canthus and the nose, to heal by granulation.

On the fourth day after the operation, the stitches were removed, and though the incisions healed by first intention, the small granulation surface did not present a healthy appearance. About the seventh day, I observed a slight exophthalmos of the right eye, and as this has increased since,

I have grave apprehension, that there is even now a new growth forming deeply in the orbit. Vision in the right eye is reduced to 20/80, and although the fundus appears normal, it is more than likely, that there exists a retrobulbar neuritis, due to pressure, causing the diminution in vision. On the tenth day after the operation, the patient, as previously agreed upon, was sent to the Skin and Cancer Hospital, in order to be treated by the x-ray and injections of Colay's fluid. The microscopic specimen, which I present to you was prepared by Dr. Tiedemann and proves the tumor to be a small round cell sarcoma. Rapidly growing tu-

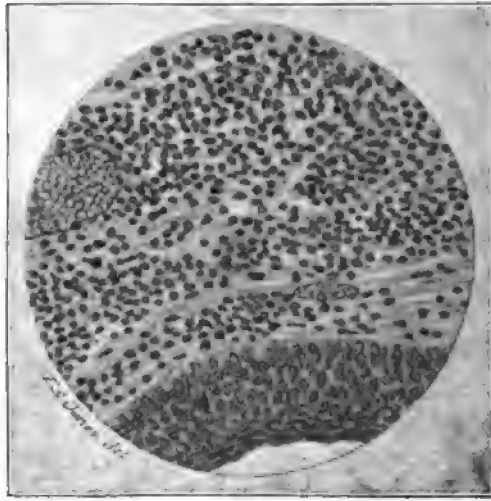


Figure 3.

mors in children must be looked upon with suspicion and early recognition of their character is very important. Of the malignant tumors, occurring in childhood, sarcomata are found most frequently. An injury seems at times to be the exciting cause.

Sarcomata of the orbit proper, that is excepting those which primarily occur in the eye-ball and optic nerve, generally originate either from the cellular tissue behind the eye-ball or from the periosteum. When springing from the periosteum, the tumor grows not only outwards, but

also inwards, and invades and infiltrates the surrounding tissue so rapidly, as to make it almost impossible to remove the neoplasm completely. If the patient does not succumb to the extension of the primary growth, a fatal termination is most frequently caused by metastases. In this present case the tumor took its origin from the periosteum, and I am forced to the conclusion, that the patient's chances for recovery are very slim indeed. One word in regard to the treatment of sarcomata by Colay's fluid. It has been observed, that patients afflicted with sarcomatous growths sometimes recovered spontaneously after an attack of erysipelas. Working on the theory, that the toxins of germs producing erysipelas influenced these neoplasms favorably, Dr. Colay, of New York, about fifteen years ago, and since then others, began to experiment on cases of inoperable sarcoma by using as injection a bouillon, prepared from a mixed culture of streptococcus and prodigious bacilli. This, of course, is a last resort and the results obtained do not seem to be uniformly encouraging. Since I have seen this patient last, a third operation was deemed advisable and complete exenteration of the right orbit has been performed by Dr. H. G. Mudd.

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PROBABLE CONGENITAL CIRCUMSCRIBED DEFECT IN THE CHORIOID, WITH ANOMALOUS PIGMENT AND VASCULAR ARRANGEMENT.*

WENDELL REBER, M. D.,

PHILADELPHIA.

A. C., who is the subject of the anomaly to be described, came to the writer's service at the Samaritan Hospital on February 6th, 1908. He had been referred by his school principal on the recommendation of the school physician because of a suspected refractive error. The patient is a healthy, well-nourished colored boy, twelve years of age, giving a history of measles at six but of no other of the diseases of childhood. The mother states that he was a full term child. He presents no other congenital defects that could be found. He states that as nearly as he can remember he has never seen well with the right eye. On the Fourth of July, 1905, some loose powder over which he was bending exploded and a little of it flew into his right eye. The eye is said to have been red for a few days, and the mother states that the child was taken to a hospital on the day afterward, but she cannot remember what hospital it was. An eye wash was prescribed, and the eye quieted down in two or three days. In view of these statements it seems most probable that there was a slight traumatic conjunctivitis of short duration. The mother is a fine physical specimen who has always enjoyed good health. She has borne three other children, one of whom is now the victim of palsy of the lower extremities (so she says) following cerebrospinal meningitis. The other two are perfectly developed children. Their eyes as well as those of the mother present no congenital anomalies and their vision is normal. The father died five years ago probably from apoplexy.

*Read before the Section on Ophthalmology, College of Physicians, Philadelphia, March 19, 1908.

No definite facts could be gained as to this point. He was about forty-seven at the time of his death.

Status Praesens.—On examination, it was found that the anterior ocular segment was normal in each eye. The vision in the right eye equalled 2/60, and in the left eye 5/5. The pupillary status was R. 5 mm., reacting 1.5 mm. to light. L. 4.5 mm., reacting 2 mm. to light. The ophthalmometer showed astigmatism. R. .5 diopter with the rule; L. .25 diopter with the rule. The left eyeground is normal in all respects.

In the right eyeground, the optic nerve head is of the same size, color and good outline as in the left eye (that is, normal). Situated in the macular region is a clearly defined white area, about 8 by 9 r. v. diameters with its long axis at 45 degrees. There is a very thin pigment line all round this white area which latter seems, with the direct method to focus with a lens 2 diopters stronger than that required for the adjacent retina. One of my confreres who saw the case thought that the white area seemed a trifle depressed but he finally concluded that it was flat although on plane with the nearby retina. The surface of this area is uneven and various parts of it are on different levels.

The area in question is marked at three or four places with minute collections of pigment, and at what is approximately its center is found a small funnel-shaped depression exactly the size and shape of the normal fovea. The retinal vessels traverse this area without the slightest break in their continuity, but seeming elevation at its edge.

Adjoining the area just described, and reaching out above and temporalward irregularly (two to three disk diameters) is a peculiarly pigmented area about two by three disk diameters. It resembles more closely a mossagate effect than anything else. The pigment rests on a yellow background. Just above the white area it is striated something after the fashion of the stellate macular figure of albuminuric retinitis. Below it there is very fine striation like the corona of the sun during eclipse. The anomalous pigment arrangement follows the superior temporal artery for quite a distance being irregularly disposed on either side of it. In this latter situation the effect is much lighter, with less pigment, and of the passover-bread character seen in re-

tinitis circinata, Stretching out temporalward from the lower border of the white area for four disk diameters are five of the same passover-bread splotchings, the last one being lower down than the rest. So that they almost circle about the macula. Far out in the temporal region and lying between the upper and lower passover-bread markings, are six or seven small ampulliform dilations of one of the arteries, and one apparently three to four retinal vein diameters in extent, This latter is of a peculiar bluish hue. I am much indebted to Dr. Mary Buchanan for the beautiful drawing here shown. (Frontispiece.)

The history of injury to the eye by the exploding gunpowder some years ago can hardly be considered a factor in this case. The ophthalmoscopic findings are against any such supposition, as rupture of the chorioid would hardly take on any such circular shape as is here shown. That the condition is one acquired since birth is also improbable, first, because of the absence of the pigment heaping so characteristic of all postnatal chorioidal inflammations; second, because of the absence of any other chorioidal lesions elsewhere in the fundus. Therefore by exclusion the writer is forced to the conclusion that the picture presented is a congenital one, and in all probability either an exudation or a coloboma of the chorioid in the macular region. That the retina is continued over the area is quite possible, and is rather presumed from the fact that the retinal vessels course over it without any perceptible break, and the further fact that the fovea seems present. When it is remembered that this white area is just about the size of the normal disk and that therefore it is approximately $1\frac{1}{2}$ to 2 mm. in anatomic extent, it is not difficult to believe that the retina is carried over this 2 mm. area in the chorioid. In the Haab-deSchweinitz Hand-Atlas of Ophthalmoscopy (Fig. 9-b) is pictured an almost identical chorioidal defect, situated, however, to the nasal side, a trifle larger than the optic nerve and traversed by the retinal vessels.

Quite a goodly number of congenital defects in the chorioid are to be found in the literature. The earliest cases were described as is known by von Ammon (1852), Streetfield, Talko, de Wecker and Reich. In 1893, Bock, in his

monograph, collected thirty-one histories, and added a few others. Fifteen or more have been recorded since, so that there are now somewhere near fifty cases on record. Of this number not a few have been reported by our Philadelphia brethren. De Schweinitz and Randall described a coloboma of the chorioid adjoining the nerve head nasally and below. Veasey (Knapp's Archives, Vol. 24, p. 202) records a double coloboma of the chorioid downward, and Posey's case (Univ. Med. Mag., 1894) of coloboma of the macula is well known.

The term "coloboma of the macula" should be used as Parsons contends, only in a topographical sense to indicate a partial atypical coloboma of the chorioid and retina since "the macula is not developed in the fetal cleft." Lindsay Johnson (Knapp's Archives, Vol. 19, p. 1) prefers to call them "extra-papillary colobomata," and believes they may represent a nevus of the chorioid that eventually goes on to absorption with cicatricial formation. Von Ammon's rotation theory is by many no longer held tenable, and Hanover's idea of a weakened sclera at the site of the coloboma seems not to have been taken seriously. The possibility that these colobomata may be the result of intrauterine inflammations as first advanced by Schweigger has many adherents today. Whether this case could be classed as a true coloboma or as a defect in the chorioid filled in with organized exudate as the result of an intrauterine inflammation it is impossible to say. It is Lang's feeling (Am. Sys. of Ophthal.) that such chorioidal defects are due to the formation of an adhesion between the retinal epiblast and the chorioidal mesoblast which results in a failure of the mesoblast to become differentiated into chorioid and sclera. With this view Ginsberg (Centralb. f. prakt. Augenh., 1896) agrees. To the writer the latter idea appeals most as it would seem to explain the occurrence of all manner of defects in any of the tunics in any part of the fundus.

Macular coloboma has been examined microscopically by Bock, Hess (rabbit), Zimmermann (dog), Deyl and van Duyse.

In Bock's case the chorioid and pigment epithelium were absent, and the retina formed a very thin membrane with remnants of the nuclear layer. In Deyl's case the chorioid

resembled scleral tissue with much pigment about the vessels, the retina covered the whole area, but the inner layers became thin, and the outer disappeared at the edges. Hess found ectasia with thinning of the sclera to one-tenth of the normal, absence of chorioid, and reduction of the retina to a very delicate fibrous membrane. In Zimmermann's case the retina and chorioid were absent.

(Von Hippel, Graefe-Saemisch Handbuch der gesamten Augenheilkunde, 2nd edition.)

1212 Spruce Street.

THE RESTORATION OF CONTRACTED SOCKETS.*

WILLIAM ZENTMAYER, M. D.,

PHILADELPHIA.

No operation in ophthalmic surgery is approached with less confidence as to its successful outcome than one undertaken for the correction of symblepharon. Any modifying procedure which increases the chances of success of an established operation or any novel method of operating is worthy of publicity.

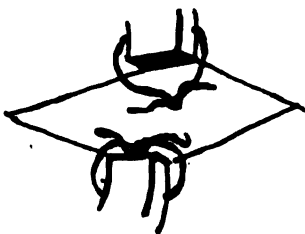
The difficulty in obtaining a successful result in symblepharon is no less when this condition occurs after enucleation, and is indeed often greater, owing to the fact that as a rule the only available method of treatment is the transplantation of grafts, for the success of which the conditions are the least favorable. As it is stated by Haab "the less yielding the soil to which the flap is to be transplanted, the more quickly it will heal, and the less will be the secondary shrinking." A decided advance came with the introduction by Hotz of lead plates, and by May of the artificial eye to hold the graft in place. It was the latter method that suggested to me the use, in one of my cases, of a large glass sphere, such as is employed in the Mules operation, upon which to spread the graft in order to keep it in place until it has become firmly attached. In a second case, the plan pursued was one practiced by Dr. Conrad Berens of the Wills' Hospital staff. The result has been very satisfactory. In a discussion at a recent meeting of the Wills' Hospital Clinical Society, several of my colleagues testified to having had success with the operation.

On May 4, 1905, R. M. came to Wills' Hospital stating that twelve years before, the sight of the left eye had been destroyed as the result of a blow from a piece of coal, and that two years ago the shrunken globe had been enucleated. He was unable to wear an artificial eye and came to see whether an operation would correct the trouble. There

*Read before the Section on Ophthalmology, College of Physicians, Philadelphia, March 19, 1908.

was a broad cicatricial band extending from the apex of the socket to the outer angle of the orbit. Midway between the apex and the sulcus there was an annular band of cicatricial tissue.

The broad straight band was dissected out. After the bleeding had ceased, a large Thiersch graft which had been taken from the arm was spread upon a glass globe which had been selected to fit snugly into the cavity of the socket. The epidermal surface was placed in contact with the glass surface. The globe was then introduced so that the flap came in contact with the exposed raw area. The lids were then strapped down with adhesive plaster and the usual dry dressing applied. The globe was kept in for three weeks. The operation was performed on the fifth of May. When



Divided band. Triangular area represents raw bed-surface produced by division of band. Sutures in position to be tied over face of cut ends.

the patient was last seen on the fifth of July of the same year, the graft had undergone considerable shrinking, but an artificial eye of natural size, could be worn.

The second case was one of extensive lime burn of the anterior segment of the globe and of the lids. The patient was a man aged twenty-five years. At the end of a week's treatment the eye appeared better and hopes were entertained of saving it, but these proved delusive, and about three weeks from the time of the accident, the cornea had entirely sloughed away and the lens escaped. The eye was enucleated. The somewhat difficult operation was rendered easier by first passing a thick suture through the sclerotic from one side of the cornea to the other; the ends were left long so that they could be held by the left hand

and the suture used as a guide and fixation during the subsequent steps of the operation, a helpful device suggested, I believe, by Dr. W. W. McClure. Two weeks later a symblepharon began to form which finally left two bands extending from near the edge of the upper lid to the equator of the orbit. On the 27th of June, a lead wire was introduced beneath the larger band, and the band later divided. This failed to improve the condition. On the 15th of October, assisted by Dr. Berens, I performed the operation devised by him. (The cut illustrates the second method.)

Having selected the more extensive of the bands, it was grasped deeply by fixation forceps near one of its attachments and with a stout curved needle, a suture was carried beneath it. It was next seized in a like manner at the other end of its attachment, and similarly transfixed by a suture. With a pair of straight scissors the band was then thoroughly divided midway between the two sutures. This left two free apposed raw end surfaces with an intervening irregular raw bed surface. Grasping the ends of one of the sutures, the assistant seized the corresponding cut end of the band and raised it from its bed so that the suture could be tied across the face of its raw end thus inverting and tucking in the cut edges. The other suture was tied in a similar manner. The intervening raw surface was then covered in by bringing its edges together with a suture. One week later the second band was treated in a like manner. By slowly increasing the size of the artificial eye the patient is now able to wear one of moderate size. The surface of the socket is at present smooth.

1819 Spruce Street.

GENERAL PATHOLOGY OF THE PUPIL.

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MARBURG.

Translated from the *Zeitschrift f. Augenheilkunde*, Band
xviii, Heft 6, by FREDERICK KRAUSS, M. D.,

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The pathology of the pupil has not been accorded the interest that it deserves.

Unfortunately the large amount of material allows me to give but an outline in the limited time put at my disposal. My theme divides itself into three main divisions:

1. The pathology of the pathways for contraction to light.
2. The pathology of the pathways for pupillary dilatation.
3. The description of reflex immobility.

I.—LIGHT CONTRACTION PATHS.

Beginning with the centripetal portion of the pathways for reflex contraction, I find that in unilateral destruction of the retina or optic nerve, the direct and indirect light reaction of the affected eye is absent, though the consensual reaction remains. The pupil of the blind eye is wider than that of its fellow in uncomplicated cases.

The convergence reaction remains, as well as the reaction to sensory and psychic irritation.

In bilateral destruction of the retina and optic nerve, the direct and indirect light reactions are absent from both eyes, and the pupils are enlarged. The convergence reaction, though often slight, is present, but the dilatation of the pupil to sensory and psychic stimulus is absent.

Nearly equal lessening of the vision and light reaction of the pupil is the rule in lesions of the optic nerve. In variations of this relationship, if simultaneous lesions of the centrifugal channels can be excluded, we must think of an

affection of the nerve, varying in strength, an elective affection of the optic nerve or of the pupillary fibers.

I think that the name of complete inaction of the pupil, "reflex deafness" (reflex taubheit), is not adapted for teaching purposes and suggest the use of the term amaurotic immobility or pupillary inaction in peripheral amaurosis.

Unilateral Disturbance of the Light Reaction. Hemianopic Pupillary Inaction.—I turn to the consideration of another disturbance of the pupillary reaction occurring in disease of the centripetal fibres for the light reflex, namely, hemianopic pupillary inaction, whose existence seemed fairly established by numerous studies in the last two decades, but which is again rendered uncertain by the recent studies of C. Hess.

While normally both pupils react to light when either half of the retina is illuminated, in certain pathological conditions, the illumination of a retinal half is followed by a reduced reaction of both pupils. The characteristic feature is the inaction of the pupil when one-half of the retina is illuminated.

Generally the disturbance is bilateral, rarely unilateral. The convergence reaction as well as the reaction to psychical and sensory irritation remains normal.

In spite of the complete failure of the reflex irritability of one-half the retina, the ordinary examination of the pupillary reaction discloses only a diminution and not abolition of the light reflex on account of the diffusion of the light.

Hemianopic pupillary inaction may be caused as follows:

1. In changes in the eye itself which cause abolition of this function in one-half of the retina.
2. In unilateral lesion of the optic nerve.
3. In affections of the chiasm.
4. In affections of the optic tract.
5. In disturbance of the anterior arm of the quadrageminae, and in the area between the oculomotor nucleus and the quadrageminae.

As long as the pupillary and optic nerve fibers are united, hemianopic pupillary inaction and hemianopsia are both present. Immediately anterior to the corpus geniculatum there is separation of these fibers, consequently either hemianopsia or hemianopic pupillary inaction may occur.

Absolute (total, complete, universal) Pupillary Inaction.—I will now consider the pupillary disturbance occurring in the centrifugal paths, namely, in the lesions of the oculomotor nucleus and peripheral therefrom. We usually term this absolute pupillary inaction. Synonyms are "total," "complete," "universal" pupillary inaction.

In absolute inaction the reactions of the pupil to direct and indirect light, to convergence and dilatation of the pupil to sensory any psychic stimuli are absent.

Absolute pupillary inaction is generally due to a palsy of the sphincter of the pupil. Very seldom can it be caused by a spasm of the sphincter pupillae or an irritated state of the dilator pupillae.

Palsy of the sphincter of the pupil may be observed isolated, or accompanied with palsies of the ocular muscles, especially the muscle of accommodation. All possible variations may be seen.

The causation of absolute pupillary inaction may be located anywhere along the centrifugal fibers, from the nucleus to the muscle. Additionally a disturbance of the cerebral cortex can cause a hindrance in the conduction of the oculomotorius.

In the differentiation between palsy due to lesions of the ciliary ganglion and short ciliary nerves, or between the ganglion and cerebrum, the use of eserine is recommended on account of its known irritative action upon the short ciliary nerves.

In the former case its action is negative, while in the latter it is positive. This statement is not fully accepted, and requires further systematic study.

Absolute pupillary inaction caused by palsy of the sphincter may be due to various diseases, principally to infections, intoxications and traumatism. It may also be hereditary.

Recent investigation has also proved its presence in hysteria, epilepsy, and in severely excited conditions. Pupillary inaction may also be due to high intraocular tension, and synechiae between the iris and lens.

Neurotonic and Myotonic Reaction (Saenger.)—I include a short description of the neurotonic and myotonic reactions, wherein they differ from the typical conditions of the pupil

in disturbances of the centrifugal and centripetal pupillary contraction tracts.

Its characteristic is in the relative continuance of the pupil in state of contraction or dilatation. The change between these two states may occur normally or in a slower manner.

Rarely is this reaction unaccompanied by other organic lesions. Generally in the neurotonic reaction there is a lesion of the centripetal, and in the myotonic, a lesion of the centrifugal reflex tract, in such a manner that the reaction takes place only after prolonged action of light or convergence impulses. Both disturbances require further study.

II.—PATHOLOGY OF THE PUPILLARY DILATATION CENTERS AND TRACTS.

Pupillary dilatation was until recently thought to be due practically entirely to the action of fibers from the sympathetic of the neck. Recently it is considered more probable that the action is more especially due to a hindrance or check to the action of the oculomotor nerve of the sphincter.

Pupillary dilatation may be studied as to

1. The pathology of the cervical sympathetic, that is the active dilatation.

2. The pathology of the centres and tracts in connection with the passive pupillary dilatation.

1. *Active Pupillary Dilatation.*—A maximum dilatation of the pupil will follow strong irritation of the sympathetics of the neck, even when the eye is exposed to strong light.

Spastic mydriasis is very rare in human pathology, but the reverse condition, the so-called Horner symptom-complex, is rather common. It consists of miosis, ptosis, enophthalmos, and lowering of intraocular tension. These symptoms are not always present in the same degree, and occasionally some are absent.

The reaction of the pupil to light and convergence in the miosis caused by destruction of fibers from the sympathetic is still present and prompt, its excursion being narrower. The pupillary dilatation is psychic and sensory irritation is also retained.

Exact studies of the quantitative and qualitative relations of this reaction are important and desirable.

The Horner symptom-complex has frequently been produced experimentally in animals, and recently as a therapeutic means in human beings, by removal of the upper sympathetic ganglion or by the cutting of the fibres of the sympathetics of the neck.

It is of importance that these appearances occurring immediately after the operation are, as a rule, of short duration. Shortly after the operation the pupil gets wider, and is especially wide under the influence of narcosis, pain, fear, convulsions and asphyxia.

It is of great interest and value to elucidate similar effects in the human pathology of the sympathetics of the neck, on account of its being a contra-indication to the operative removal of the superior cervical ganglion for glaucoma.

The clinical appearances of sudden and gradual destruction of the cervical sympathetic are considerably different.

Automaty.—We understand in this term the ability of the smooth iris muscle to become active under the influence of the blood. The blood irritation acts peripherally on the muscle itself. This irritability is caused by the destruction of the nervous connection with the cervical sympathetic. It does not begin immediately after section of the sympathetic, but about twenty-four hours later.

Passive Pupillary Dilatation.—We turn to the passive pupillary dilatation showing itself clinically by the absence of dilatation by sensory and psychic irritation, which is observed in absolute immobility, and in reflex inaction. The underlying causes are radically different.

In absolute immobility, the pupillary sphincter is palsied, and wider dilatation is impossible. Further dilatation after psychic and sensory irritation is absent. The seat of the disturbance is in the muscle itself, or in direct connection with its nerve tracts and centers.

According to this, it would appear that the failure of passive pupillary dilatation was always due to palsy of the sphincter pupillae.

Experimental studies in animals are not so unanimous as the clinical observations in man would indicate.

Some observers state that passive pupillary dilatation is impossible after section of the oculomotor nerve, while others state that in addition to section of the short ciliary

nerves and ciliary ganglion (equivalent to oculomotor section) section of the cervical sympathetic nerve is required before this result is obtained. ,

This apparent contradiction can be explained by a difference in procedure and interval of observation after the performance of the operation.

Immediately after cessation of the sphincter innervation, there is a cramp of the dilator which is gradually lost.

It is to be desired that by exact clinical study of absolute immobility in its various stages, and by further study of experimental results, this apparent contradiction will be explained, and thereby the question definitely answered as to whether passive pupillary dilatation is complete through sphincter palsy, or if dilator irritation is required.

Aside from absolute inaction we may observe a failure of passive pupillary dilatation in the so-called reflex pupillary immobility.

In this pupillary phenomenon the cause of the disturbance is not in the muscle, nor in the directly connected nerve centers or tracts, but the disturbance is beyond the nucleus of the oculomotor nerve.

Experimental study has taught us that a lessening of oculomotor tone follows sensory and psychic irritation by action of the cerebrum. Perhaps the medulla oblongata plays a part. It may therefore be inferred that the failure of passive pupillary dilatation in reflex inaction may be due to damage to the cerebrum or tracts leading to or from the same.

The failure of passive pupillary dilatation has led us to the interesting and diagnostically important pupil anomaly, reflex pupillary inaction, which we will now consider.

III.—REFLEX PUPILLARY INACTION.

In typical cases the direct and indirect light reaction, as well as the dilatation of the pupil by sensory and psychic irritation are absent, while the convergence reaction remains normal and may in fact be increased and more prompt on account of the failure of reflex dilatation. Miosis is usually present.

Reflex inaction is nearly always produced gradually over a period of months, even years.

Variations of the Clinical Phenomena.—Many variations of the clinical picture occur. They are caused by the fact

that the clinical picture is not always the same on both sides, and for a long time may be unilateral; and further, to the fact that the component factors forming reflex immobility, namely, disturbance of the light reaction on the one hand, and absence of reflex dilatation on the other, are not equally affected in the same degree nor in the same time.

Pupillary Inequality.—Frequently is this condition observed in reflex immobility; it occurs in about 50 per cent of cases. It is explained, aside from other pupillary disturbances, by an unequally advanced stage of the disturbing process.

Changes in Pupillary Width.—The pupillary width can vary on different days. The changes are usually small; according to my experience they are only observed in cases where reflex immobility is in process of formation.

Many reports in literature concerning changes in pupillary width in reflex inaction are doubtlessly explained by not adhering to similar methods of observation.

Intermittent Reflex Immobility.—The same failure of careful study is probably the explanation of the so-called intermittent reflex immobility. Slight variations in light reaction have been observed by me, but typical cases of intermittent immobility never.

Change in Shape of the Pupil.—A very common though not characteristic phenomenon in reflex immobility is loss of roundness of pupil.

Its appearance cannot be explained with certainty, as all theories have important objections. Perhaps the systematic use of mydriatics and miotics will assist in its explanation.

The Lid Closure Reaction.—By this term we understand a change in the pupillary size synchronous with the closure of the lid. This particularly will be observed in reflex immobility, as the disturbing influence of the light reaction is absent.

A certain diagnostic and sometimes differential diagnostic importance is attached to the fact that this reaction is sometimes exceedingly prompt and extensive in reflex immobility. An ignorance of this fact not infrequently leads

to a false diagnosis,—paradoxical pupil reaction for instance.

The Causation of Miosis.—In the description of the clinical picture of reflex immobility, miosis is found, whereas one would imagine that pupillary dilatation would be present because of the absence of the light reaction.

Various hypotheses have been advanced. I think the theory advanced by Erb has most merit, namely, that it is due to the absence of the dilatation caused by sensory and psychic irritation. I advise further studies in cases of reflex immobility that are in process of formation.

I think that the miosis is similar to that seen in sleep or after administration of narcotics.

The Causation of Direct and Indirect Loss of Light Reflex.—The majority of authors believe that this is due to destruction in the fibers leading from the optic tract to the nucleus of the oculomotor nerve. This localization does not explain the clinical symptoms of reflex immobility.

The author believes that neither the corpora quadrigeminae, nor the Edinger-Westphal nucleus and the oculomotor nucleus are the causation factors.

One could suppose an elective disease of the fibers for the light reflex in the centrifugal reflex bow, but this would leave the miosis of the reflex immobility without explanation.

I believe that there is a retarding center for light contraction and reflex pupillary widening situated in the medulla oblongata, as I hope to demonstrate in a succeeding paper.

Differential Diagnosis Between Reflex and Absolute Pupillary Inaction.—Many authors consider the absolute inaction an advanced stadium of reflex immobility, and in this conception the absolute immobility of progressive paralysis and tabes palsy is called total reflex immobility.

In most cases it is impossible to state that absolute immobility has preceded reflex immobility, and in any case a similar cause and localization cannot be proved. Until this can be demonstrated, I believe that these conditions should be differentiated.

The typical picture of reflex immobility can remain un-

altered for years. It is not the rule that absolute inaction will follow eventually.

Occasionally the differential diagnosis between reflex and absolute immobility is rendered difficult because the pupillary anomalies are not fully developed, or are in a state of retrogression. Particularly common is the mistaking of a regression stage of absolute immobility for reflex immobility. It is possible, for instance, in regressive absolute immobility to have a stadium in which the light reflex cannot contract the pupil, but in which the stronger acting convergence impulse will cause contraction.

The contraction is rather slight, or sluggish, whereas the contraction of convergence in reflex immobility is very prompt and of greater extent. This fact is most important.

Paradoxical Light Reaction.—By this we understand a pupillary dilatation upon exposure to light and a contraction in shadow.

I believe that in the majority of cases a false diagnosis has been made because of insufficient knowledge of pupillary phenomena and incomplete examinations.

Springing Pupils.—This rather rare affection is divided clinically and genetically into three groups.

In the first group belong those cases in which one pupil changes its diameter, varying from a greater width to a less than normal without action of light or convergence. These changes occur at regular intervals of one minute and last a certain time. This clinical picture is seen in eyes which have oculomotor palsy, congenital or developing in early childhood.

There are certain connections between this disease and the post-hemiplegic form of hemiathetosis.

In the second group one pupil, and that the normal one, only changes in diameter in accordance with the circumstances of the examination, while the pathologic pupil is stationary.

The unequal pupillary width depends upon unilateral sphincter palsy.

In the third group the relative sizes of the pupils are changed at various times. As there is usually an evident greater width of one pupil or the other, the term of springing mydriasis is usually applied.

The early observations of this change were seen in tabes and progressive palsy, and was thought to indicate a serious prognosis.

Recent observers have noted this condition in functional neurosis, and in apparently well individuals, which would indicate its harmlessness.

Hippus Iridis.—Physiologically the width of the pupil oscillates more or less.

The author agrees with Gaupp in the following definition: Hippus iridis consists of rhythmic contractions and dilatations of the pupil, changing every one to three seconds, occurring independently of light, convergence, psychic or sensory irritations.

The excursions are usually of the same degree, varying as a rule from two to three mm.

Hippus is usually bilateral, very rarely unilateral.

It is seen in all varieties of diseases of the cerebrospinal system, and at present has no pathognomonic significance. Its etiology is obscure.

THE ZONULA CILIARIS AND ITS RELATION TO NEIGHBORING STRUCTURES.

MAXIMILIAN SALZMANN, M. D.,
WIEN.

TRANSLATED BY E. V. L. BROWN, M. D.,

CHICAGO, U. S. A.

(Continued from the January Number.)

In the lens capsule one distinguishes an anterior and a posterior capsule, although each is only a part of one and the same capsule. With the border layers of the vitreous it is different. The anterior border layer is separated from the posterior anatomically. Although this separation is not made by an empty space, yet it is made by a fissure which opens forward into the orbicular space, and serves as the point of exit for a part of the zonular fibrillae, namely, for those which come out of the vitreous itself and from the ciliary zone of the hyaloidea. I would therefore call it the zonular fissure of the border layer.

This fissure appears to vary a great deal in width. Yet I have always found it at least 0.3 mm. wide (in the meridional direction). Its posterior margin (Figs. 11, 20; hy) cannot be accurately placed, because of the gradual coursing-out of the posterior border layer. Its anterior margin is formed by the peripheral margin of the anterior border layer (Figs. 11, 20; vG). Many times this margin appears pretty sharp, as in the preparation shown in Fig. 11 where the whole fiber mass of the anterior border layer bends about and spreads apart in waves toward the body of the vitreous. In other eyes the anterior border layer ceases more gradually.

The zonular fissure is filled out by a loose plexus of vitreous fibrillae which wind about the zonular fibers obliquely from without and forward, inward and backward (Fig. 11, vb). This fibrillar plexus continues into the first part of the orbicular space, and forms in this way a union between the periphery of the anterior border layer and the inner glass membrane of

the pars ciliaris retinae. The discussion of this union will give me an opportunity to speak further on this relationship.

The peripheral margin of the anterior border layer falls, according to the above statements, about the middle of the orbiculus ciliaris, and its distance from the margin of the lens, measured along the surface, is about 4 mm. Freed from adjacent structures and laid out flat, the anterior border layer forms a rounded circular membrane of about 18 mm. diameter.

For the sake of better orientation and an easier description, the anterior border layer may be divided into zones corresponding to the structures in contact with it (see Figs. 12, 20). The most peripheral zone is then the orbicular zone, then comes the coronal zone, the circumlental zone, and finally, the lental zone. The orbicular zone (Fig. 12, Orb.; Fig. 20, 1-2) corresponds to the anterior half of the orbiculus ciliaris. It has a breadth of about 2 mm., and is covered by zonular fibers in preparations obtained in the manner described above (page 37). For these fibers tear at the anterior margin of the orbiculus ciliaris. However, when one separates the ora serrata retinae and the posterior border layer together with the origin of the zonula in the preparation, one obtains the orbicular zone free from zonular fibers, aside from those which have some relation to the anterior border layer itself. This separation is easily affected because of the loose union of these structures to the anterior border layer. Figure 12 shows it in this condition. This zone is smooth throughout, aside from fine circular folds which are found in all parts of the anterior border layer, except in the lental zone.

The coronal zone (Fig. 12, Cor.; Fig. 20, 2-3) has a breadth of 1 mm. It corresponds to the posterior half of the ciliary processes, since only these are adjacent to the border layer. The border layer is slightly depressed in this zone. The depressions are more marked corresponding to the processes than to the valleys. Viewed from in front, the border layer presents, therefore, low meridional furrows corresponding to the processes and low elevations corresponding to the ciliary valleys. This is the most interesting part of the anterior border layer. Here one finds peculiar attachments to the pars ciliaris retinae (Fig. 12, Ca), radiations of the zonular fibers into the border layer (Fig. 12, z', z''), and circular fibers in the layer itself. These latter bring about the strikingly well marked

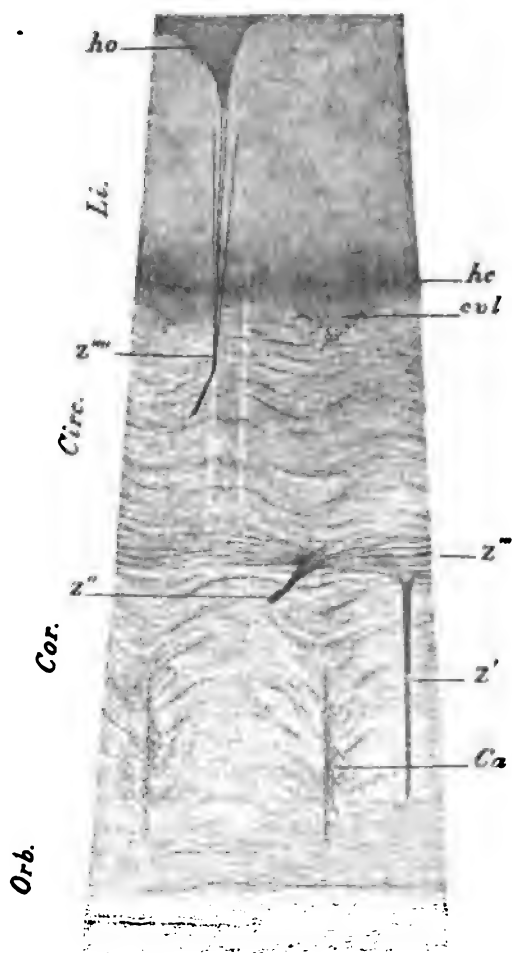


FIG. 12.—A narrow sector of the anterior border layer corresponding to two ciliary valleys and two processes seen from the front surface. Combination picture. Magnified forty times.

Orb.—Orbicular zone. Only the foremost part is drawn.

Cor.—Coronal zone with two Campos' ligaments (*Ca*).

The smooth parts between the two are impressions corresponding to the ridges on the ciliary processes. *z'* is an inner and *z''* a short zonular fiber bundle probably coming from the corona ciliaris; both end in the border layer, and for the most part go over into the band of circular zonular fibers (*z'''*).

Circ.—Circumlental zone; *z'''* represents a small inner zonular fiber-bundle, which has stuck to the border layer. Behind the end, one sees the low furrow in which the bundle lies as a clearer stripe. Near this is an empty furrow.

Li—Lental zone; *hc*—ligamentum hyaloideo-capsulare; *cvl*—remnant of the fetal capsula vasculosa lentis; *ho*—homogeneous lamella into which the tiny bundle *z'''* go over.

circular folding which one so often sees in this zone (Fig. 12, z''; Fig. 20, cF).

The circumlental zone (Fig. 12, Circ; Fig. 20, 3-4) shows nothing especially characteristic; it is likewise about 1 mm. broad. The inequalities corresponding to the ciliary processes extend partially into this zone, and where the innermost zonular fibers lie upon the zone, sharply marked, low furrows result which are indicated by their clear color. Many times, however, the fibers which produce the furrows, here still cling to the furrows. The furrows are generally present in other zones, too, but they are usually more easily seen in the circumlental zone.

There is frequently a ring-form condensation of the border layer at the border of the circumlental and lental zone (Fig. 12, hc). It is a darker colored ring which pales out on both sides and can only be due to a condensation of the border layer, for one can never recognize a thickening at this place upon meridional sections.

The ring is not to be seen in all preparations. When present, it shows a development which is irregular in that it is either present only on the nasal side, or is darker, narrower and more sharply demarcated here.

There is no doubt that this ring is identical with the structure which Wieger (21) has described under the name *ligamentum hyaloideo-capsulare*. Yet the term ligament seems to me to be rather inapplicable to the ring, since it lies entirely within the border layer itself. However, this is the place where the anterior border layer engages the posterior surface of the lens, as the injection experiments of Wieger show.

The *ligamentum hyaloideo-capsulare* is interesting in another direction; it is the point of insertion for a delicate layer of fibrillae which are drawn over the equatorial zone of the lens (see farther on).

The lental zone (Fig. 12, Li) is a segment of a spherical surface with the concavity forward, measuring about 10 mm. in extent along the surface.

Here the border layer becomes decidedly thinner, and toward the posterior pole of the lens it fades away completely at times, so that the preparation often, though not always, shows a central defect.

Study by higher magnification shows that the main mass of the anterior border layer at the periphery is fibrillated in a

circular direction; the extremely fine network of fibrillae which characterizes the border layer shows very narrow, rather long meshes coursing in a circular direction, so that at least the majority of the fibrillae have more of a circular direction than any other. This arrangement is present as far as the circumlental zone, and also the ligamentum hyaloideo-capsulare appears fibrillated in a circular direction. The lental portion, on the other hand, possesses a fibrillar net developed equally in all directions over the surface.

A layer of larger meridionally placed fibrillae is found on the inner surface of the border layer. These fibrillae are almost as large as the smallest zonular fibers, but differ from them by their slight wavy outline, which recalls that of elastic fibers to a certain extent.

This layer is very easily seen on surface preparations when properly focussed, and also well seen upon equatorial sections because, in this case, they appear in cross-section (see Fig. 14, 15, m).

From this layer the fibrillae diverge into the body of the vitreous, and they can be quite as well considered as fibrillae belonging to the body of the vitreous which course for a distance on the inner surface of the border layer. The anterior border layer, in general, gives off only few fibrillae to the body of the vitreous, and for this reason it appears as a uniformly thick layer from the orbiculus to the lens margin on meridional section. Only at the periphery, and in the lental portion are there a larger number of fibers given off to the body of the vitreous; this brings about the thinning toward the pole of the lens.

The thickness of the anterior border layer varies within wide limits. In my preparations it measures from 0.012 to 0.059 mm., yet the lower figure is more frequent than the higher; the mean therefore runs about 0.026 mm. A part of this difference may be due to variations in age; according to Retzius, the border layer is only developed in extra-uterine life. It is probably due in part also to the preservation and to post-mortem changes. Furthermore, the sharp demarcation of the anterior border layer from the body of the vitreous is conspicuous. This fact and its slight thickness give it the appearance of a membrane, and explain why a whole series of authors have called it the "Hyaloides."

From what has been said it scarcely need be emphasized

further, that a membrane similar to the hyaloidea of the posterior portion of the vitreous does not exist on the outer surface of the anterior border layer. The corresponding portion of the hyaloidea is a member of the pars ciliaris, namely, its inner glass membrane.

B. The Union of the Vitreous with the Inner Glass Membrane of the Pars Ciliaris Retinae.

As already noted, the separation between the anterior border layer of the vitreous and the inner glass membrane of the pars ciliaris retinae is not a complete one; the orbicular space is not entirely free, but is filled out here and there by vitreous fibrillae (aside from the zonular fibers), although they are so sparse and delicate that one can only make them out when the sections are very strongly stained. But after one's attention has once been called to them, one will note them in the usual stain, and I cannot understand why so many who have worked on this part of the anatomy have passed them by unnoticed. Their mechanical significance is nil, but they appear to have great significance for the conception of the orbicular space and the zonula.

These unions have the character of vitreous tissue in every respect. Like it, they consist of finest fibrillae, and spread out in flat nets, and for this reason they appear more or less like membranes. Since the main part of the orbicular space is taken up by zonular fibers, the fibrillar-nets of the vitreous are obliged to take a very tortuous course among the zonula fibers, and appear to be spun around them. But their real ending is in the inner glass membrane of the pars ciliaris retinae.

They are found in two different zones of the ciliary body, at the posterior border of the orbicular space, and in the ciliary valleys.

The manner in which the zonular fissure in the border layer of the vitreous is filled out by loose vitreous tissue is described in the last chapter, as well as the manner in which it is continued into the neighboring orbicular space. This continuation forms a pretty extensive and strong union between the periphery of the anterior border layer and the pars ciliaris retinae. Its extent cannot be accurately measured.

The mass of fibrillae is thickest at the posterior border of

the orbicular space, and gradually decreases forward. Its last continuations probably reach as far as the zone of the small folds (Fig. 11, 13; vb).

The union can be seen best when the vitreous is a little detached, and the orbicular space thereby artificially widened. Numerous fine fibers are then seen, even by a low power, coursing obliquely forward and outward from the outer sur-



FIG. 13.—Unions between the anterior border layer of the vitreous and the pars ciliaris retinae in the posterior part of the orbicular space. Meridional section. Magnified 100 times.

vG—Anterior border layer with its fine circular folds.

Zi—One of the innermost zonular fibers.

Z—Main mass of the zonular fibers.

C—Pars ciliaris retinae.

z'—Cross section of a zonular fiber in the vitreous itself.

vb—Fibrillar-nets uniting the anterior border layer of the vitreous and the pars ciliaris retinae.

(The ora serrata is to be thought of as lying to the left, and the corona ciliaris to the right.)

face of the anterior border layer of the vitreous to the inner surface of the pars ciliaris retinae.

Upon higher magnification, on the other hand, it becomes evident that these fibers are cross sections of membranous-like fibrillar nets. In an equatorial section the zonular fibers in this part seem to be more or less richly invested by finest vitreous fibrillae (see Fig. 14).

We have here a very striking and easily visible example of

the interweaving of zonular fibers and vitreous fibrillae which was not considered possible by all of those who have described the zonula. I do not know of any place in which such a plexus has been described, but Czermak has depicted it.

In surface preparations those unions are not visible, because many zonular fibers cling to the border layer at this point.

The union with the corona ciliaris has somewhat another character. Single membrane-like fibrillar nets raise themselves out of the flat meridional caps of this zone of the border layer. These fibrillar nets have a meridional direction, are wavy and

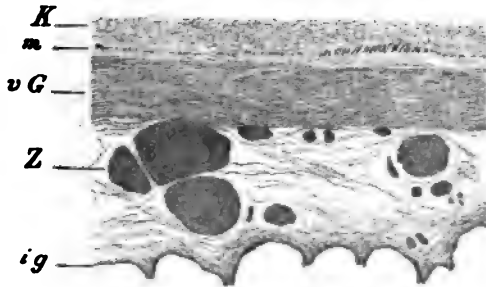


FIG. 14.—Equatorial section through the posterior part of the orbicular space. Magnified 450 times.

K—Body of the vitreous.

m—Meridionally disposed stratum of fibers.

vG—Anterior border layer.

Z—Zonular fibers invested by vitreous fibrillae which here fill out the whole orbicular space as a fine irregular net-work.

ig—Inner glass membrane of the pars ciliaris retinae; the ridges are torn away.

many times folded, gradually merge into a few larger fibrillae, which courses to the bottoms of the corresponding ciliary valleys, and spin about the few zonular fibers lying in their way.

Only one such structure is found in one ciliary valley; but they are not found in every one, and only in its posterior part where they extend backward to the anterior end of the orbiculus ciliaris. I measured their base on the vitreous in a series of transverse sections of the ciliaris body as 1.4 mm. long. This may have been a pretty large uniting strand. On the average it will not be longer than the breadth of the coronal zone of the border layer. Yet its base oftentimes extends somewhat

into the orbicular zone, so that in general it has an oblique forward course.

They are best to be seen in the transverse section of the corona ciliaris (Fig. 15). In this section one sees very well the relation of the border layer to the ciliary processes (Pr.); the border layer lies close to the processes and sags somewhat into the ciliary valley. At this portion, the strand (Ca) which unites the border layer to the pars ciliaris retinae, springs from a broadened triangular base, and courses very wavily to the floor of the valley, where its finest fibrillae are lost among the zonular fibrillae. These uniting strands are also to be seen in surface preparations, yet one usually only obtains stumps. Ragged, wing-like appendices are shown at the radial caps of the coronal zone here and there (Fig. 12, Ca).

I think I am only recognizing in these uniting strands the *Ligaments cordiformes* described by Campos (23). Under this name the author describes triangular-formed projections of the border layer of the vitreous (Campos used the expression *Hyaloides*). According to the cuts which accompany his article, such a strand is made up of two loose fibrillae wound about each other, and in any case is not made up of zonular fibers.

The strand is inserted into the pars ciliaris retinae. It is perhaps possible that Campos meant to represent the attachments found in the posterior part of the orbicular space, but the description and the drawing seem to me to correspond more to those in the corona when these attachments are made tense by detachment of the vitreous.

Also Berger appears to have seen this structure. A figure in his later work on the zonula (1887) shows fibers that are strikingly similar to those of Campos ligament.

Lastly, the relations of the border layer to the ciliary processes must be considered at this time, since concerning it very different views have been expressed. There is no doubt that the border layer is closely apposed to the posterior halves of the ciliary processes, or better, the ridges of the processes. Yet no actual fusion is present. In hardened eyes, the border layer can always be cleanly removed from the ciliary ridges. No part whatever remains clinging to the pars ciliaris, as would necessarily be the case if they were grown to one another. It is true that the pars ciliaris in a fresh eye becomes

detached very easily, and frequently remains attached to the border layer. But since the whole zonula is present in such a preparation and the pars ciliaris only comes away with the zonula, this does not seem to me to speak for a fusion with the border layer.

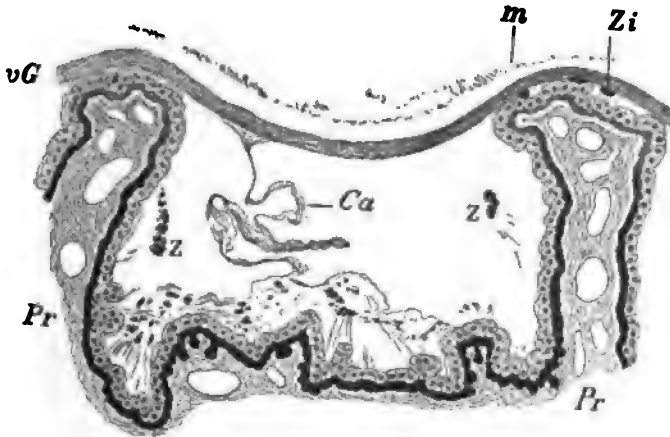


FIG. 15.—The posterior half of a ciliary valley. Transverse section. Magnified eighty diameters.

vG—Anterior border layer of the vitreous.

m—Meridionally fibrillated lamella inside the above.

Ca—"Ligament cordiforme" of Campos. Toward the bottom of the valley it broadens out, and invests the zonular fibers coursing from here to the anterior surface of the lens.

Z—Bundles of zonular fibers coursing to the posterior surface of the lens along the side of the process (Pr.).

Zi—Innermost zonular fibers, clamped in between the crest of a process and the border layer of the vitreous.

The large zonular fibers are shown in cross-section. Between them and the inner surface of the ciliary body are numerous fine fibrillae cut partly longitudinally and partly obliquely. Vitreous, Campos ligament, and the zonular fibers are shown as they appear after strong staining with Mallory's phosphomolybdic-acid hematoxylin. The ciliary processes, on the other hand, are shown in a lighter color, because they would otherwise appear only as silhouettes.

Moreover, fine zonular bundles run between the ridges of the ciliary processes and the border layer. These make up the so-called inner layer of the zonula (Berger), or the innermost zonular fibers (Figs. 13, 15; Zi). It is true that these fibers are so narrow that there is plenty of room between them for

a fusion of the ciliary ridge and the border layer. In any case, there is no such space between the two as reported by Dessauer (24), for, as mentioned above, impressions of the ciliary body are found on the border layer. An actual space only exists between the border layer and the bottoms of the valleys of the ciliary body.

C. The Union of the Vitreous with the Lens Capsule (Ligamentum hyaloideo-capsulare).

In the description of the surface view of the anterior layer, mention is made of a condensed ring which marks the place where the anterior border layer comes into apposition with the lens capsule. Reference was made to the dissertation of Wieger, who called this ring the Ligamentum hyaloideo-capsulare and showed that at this place there was not only an adhesion of the two membranes, but that also there was an actual ligament, the fibers of which he believed were inserted into the lens capsule. It is therefore conceivable that Wieger saw the same structure that I have, although his description does not entirely agree with mine.

In surface preparations (compare Fig. 12, cv1) one sees in places where the condensed ring is particularly well developed a delicate little membrane given off peripheralwards. In general it seems to be very narrow with angular expansions, which appear to correspond to the ciliary valleys. Fine wavy and frayed fibrillae are seen at its border, especially in the angular expansion. This picture recalls very much the appearance of Campos' ligament in the same preparations. Yet it differs from these not only in its position, but also in its direction. For while the Campos' ligaments are meridional membranes of the coronal zone, this membrane is circular and is found at the border of the lental zone.

Meridional sections strongly stained with Mallory's hematoxylin bring to light a layer of extremely delicate fibrillae, which are very irregular and arranged like the threads in a loose bolt of cotton-batting and which covers over the surface of the lens capsule in the region of the insertion of the zonula. This layer is not easily visible posteriorly in the neighborhood of the vitreous, and in some sections the transformation into the border layer of the vitreous is distinctly shown (Fig. 16).

It is possible that this section goes through one of the angular expansions seen on surface preparation. The sharp bor-

der toward the zonular space shows the layer of fibrillae indicated by *cvl*, which is not found in all sections, and only in the neighborhood of the vitreous. In other places the layer is as little delimited from the zonular space as is a little fleck of cotton from the space in which it lies.

The layer of fibrillae sometimes extends as far as the anterior insertion of the zonula, is matted together with the zonular

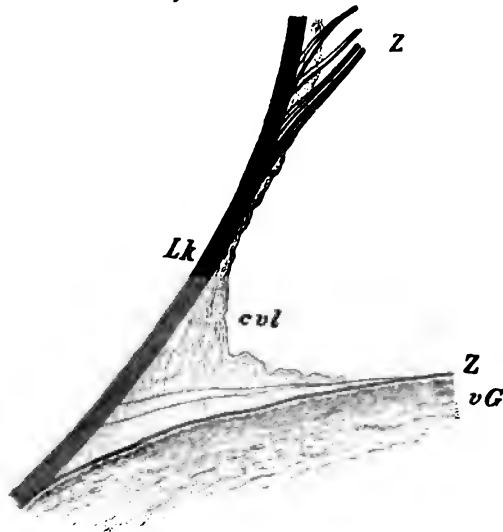


FIG. 16.—Remains(?) of the capsula vasculosa lentis. Meridional section. Magnified ninety times. Stained with Mallory's phospho-molybdic acid hematoxylin.

Lk—Lens capsule.

z—Zonular fibers.

vG—Anterior border layer.

cvl—Questionable remnant.

fibrillae where these approach the lens capsule, and forms there a somewhat thicker layer. Its thickness naturally varies a great deal in different individuals, but I have been able to find it in most of my preparations after having had my attention called to it.

Of course, one does not often see it as plainly as in the drawing given herewith. This preparation came from the eye of a 53-year-old man.

There actually exists, then, a special ligament at this place. Its position corresponds to the vascularized embryonal lens capsule. It is usually said that this structure completely disappears later in life. However, it is conceivable that this extremely delicate layer of fibrillae has been overlooked up to the present time. I am inclined to look upon it as a remnant of the embryonal capsula vasculosa lentis.*

D. The Union of the Vitreous Body with the Zonula.

From the very nature of the union of the border layer with the pars ciliaris and the lens capsule spoken of above, it follows that there is an interweaving of the fibers of the zonula and the fibrillae of the vitreous body, and yet in these places there is no actual union of the two kinds of fibers, no transmissions of the one into the other.

We will now discuss such places at which the zonular fibers, or, as the case may be, fibrillae go over into the tissue of the vitreous body. These are places at which, according to the prevailing terminology, the zonular fibers either spring from, or end in the vitreous. The few places, also, where one cannot make sure of an actual ending, although the fine primitive fibrillae of the zonula enter into a very intimate connection with the vitreous, will be discussed here.

This much I must emphasize at the very start: It is not possible to make out with certainty the finest histological relations in this transition into vitreous.

In particular, it cannot be established whether the last extensions of the zonular fibers go over into the vitreous fibrillae, or whether they simply end among them. The zonular fibers can only be followed for a certain distance into the vitreous, and are then lost to the eye. In a case where a particular structure into which the zonular fibers ordinarily are inserted (like the lens capsule or the inner glass membrane of the pars ciliaris retinae and its extensions), lies in the neighborhood, one could naturally think that the piece uniting the zonular fiber and the particular membrane under discussion had been overlooked. However, there are places where the zonular fibers lie so deeply in the vitreous, and have such a direction, that one cannot possibly have overlooked the uniting pieces.

*It is possible that the capsula vasculosa lentis contains, besides the blood vessels, which of course disappear entirely, elements of the vitreous from which this formation arises. (Salzmann.)

In view of the fact that so many authors have denied absolutely any connection of the zonula with the vitreous, one must, *a priori*, proceed with the most extreme care in passing judgment upon this connection. I did not go into this study with any preconceived idea, and if I had any particular idea before hand it was that there is no such union.

Therefore it is likely that I have good grounds for the statement when I say that I now adhere to the opposite view, and so much the more so, as, among the authors with whom I now disagree, there are two that I number among my personal friends.

When one classifies the authors who have worked upon the anatomy of the zonula for the last thirty years into those who conceive a continuity between zonula and vitreous, and those who do not, one finds that about the year 1883 separates the two groups. Almost all those who wrote before this period know, at least, of the origin of the zonula from the vitreous body in the neighborhood of the ora serrata, and, to a lesser extent, also reported endings of the zonular fibers farther forward in the vitreous. As examples of these authors I quote only Iwanoff (25), Arnold (26), Ulrich, Berger, Hocquard and Masson (27); v. Gerlach (28) on the other hand already takes the point of view of the later authors. These latter know nothing of the relations to the vitreous body; indeed, they deny it altogether and explain that the zonula has nothing to do with the vitreous. To these belong (aside from v. Gerlach) Dessauer (24), Czermak (13), Topolanski, Garnier, Schoen (29), Terrien (14). Hache (30) adheres to the older view. The statements of Agababow concerning the ending in the vitreous appear to refer only to the eyes of animals, and the same is true of the older statements of Merkel (31).

There is no doubt that the methods of investigation play a part here. The older authors obtained their conceptions of the zonula mainly from anatomical preparations. The later ones, to begin with Czermak (1885), obtained theirs mainly from microtome sections after modern imbedding procedures. And, it is true, we have to thank the latter for the more correct demonstrations of the topographical relations, and the fact that the zonula is a system of fibers, and not a continuous membrane, as conceived by the older authors. But some details which are poorly seen in sections, or cannot be seen at all, have thereby been forgotten.

It does not seem to me to be superfluous to show by this example how important it is to use all the different methods for the establishment of histological relations. The scant valuation which is sometimes given to the "incomplete histological technique of the earlier times" is not deserved. Our modern methods are very adequate for topography, and for purposes of demonstration, but they do not approach the methods of the older histology for the investigation of tissue elements.

We will first discuss the unions which are spoken of as the origin in the vitreous in the prevailing terminology. These are found in the neighborhood of the ora serrata.

It will be recalled that the posterior border layer of the vitreous gradually narrows and covers the entire ciliary zone of the hyaloidea; zonular fibers are given off from this zone, and almost all of them are given off from its anterior border, yet many of them come from places farther back. These fibers go through the posterior border layer, reach the zonular fissure in the border layer, and proceed from this into the orbicular space. One can see this best in equatorial sections through this zone. Next to the inner glass membrane of the pars ciliaris retinae, or hyaloidea as I prefer to call it at this place, as said above, lies a denser layer of the vitreous, then follows some more delicate vitreous tissue in which lies numerous fine zonular fibers coursing so obliquely toward the hyaloidea that they must unite with it in their farther course.

These fibers show nothing unusual in their origin. The only thing that is remarkable is that they course through the anterior part of the posterior border layer, and that they show a slight bending; they join the general course of the fibers in making a slight bow. Their importance lies in the fact that they might easily be taken for fibers originating out of the vitreous itself if their union to the hyaloidea were overlooked. Retzius' view seems to be that all of the origin of zonula in the vitreous is nothing else than an extension of fibers through the vitreous border layer into the hyaloidea.

But there are zonular fibers in this region which undoubtedly end in the vitreous body. When one follows the zonular fibers in a good meridional section (which must not be too thin but about 50 micra thick) toward the ora serrata, one sees even in the zonular fissure that some fibers deviate toward the vitreous, that is, they form a narrow angle with the inner surface of the pars ciliaris opening backward, whereas the fibers

which end at the pars ciliaris form angles opening toward the front of the eye. These fibers can be followed into the parts of the posterior border layer which lie inside of the ora serrata, or even farther backward at times. Finally, they become so fine that they can only be told from the grosser vitreous fibrillae by their straight course. At last they become lost to the eye from the fact that they bend out of the meridional plane, without uniting with the hyaloidea.

Fig. 11 shows such a fiber. There is no doubt that this is a zonular fiber, and not a large vitreous fibrilla. It is straight and stiff like its fellows, and crosses vitreous fibrillae at a point where all these fibrillae are arranged in wavy lines which trend inward. On cross-section (Fig. 3, Z) these fibers look as though they were stuck into tubular canals in the substance of the vitreous.

These fibers can also be seen upon surface preparations. One removes the vitreous up to the posterior border layer and mounts this layer on a slide along with the retina, the ciliary zone of the hyaloidea, and the most posterior zonular fibers, inside up. In this way one can then see one or more zonular fibers which go beyond the region of the retina and then stop. But there is such a different focus for the zonular fiber and for the inner surface of the retina in such a preparation, that there is no possibility that the two unite. Sometimes, moreover, one succeeds in teasing away part of the posterior border layer itself, and is able to show that these pieces which contain no hyaloidea at all, still give off zonular fibers, and that these are gradually lost farther back in the vitreous tissue. There are, of course, very many torn fibers, which have only penetrated the border layer to be seen here. .

It is relatively much more difficult to determine whether or not zonular fibers are given off from the end of the retina itself. Even Berger states that the zonular fibers are given off from the apices of the ora serrata, and Schoen makes the same observation, as it seems, independently of Berger. He explains the ora serrata retinae as a result of the mechanical pull of the zonula, and, according to his theory, it is a result of accommodation, and consequently a pathological condition.

One can, of course, study these relations only in a surface preparation. However, here the vitreous interferes on the one hand, and the part of the pars ciliaris retinae hanging to the

ora serrata on the other hand. The ciliary zone of the hyaloidea especially interferes with the picture, because of its unevenness. But when one succeeds in removing the ciliary zone of the hyaloidea, and consequently in making a preparation of the border of the retina with only the parts of the vitreous which cling to it, then it is true, one is able to see zonular fibers break into finest fibrillae toward the border of the retina, and to follow them into this neighborhood. It is possible that these fibers go over into the hyaloidea, but I could not recognize this with any certainty. According to the view of Schoen, these fibers are given off from Mueller's supporting fibers. I am most decidedly unable to agree with this view, for if this were the case, the zonular fibers would have to bore through the hyaloidea, which would be very improbable from their relation to the pars ciliaris retinae, aside from the fact that I can see nothing of such a union.

Though it is difficult to separate the connection between the retina and the vitreous at the ora serrata, it succeeds sometimes, as reported in the description of Fig. 9. If, now, the zonular fibers went over into the supporting fibers of the retina, no such clean separation of the retina from the hyaloidea would be possible.

A union between zonular fibers and the end of the retina does, however, appear to exist, but it is only by means of the mediation of the hyaloidea and outermost layers of the vitreous. In any case these zonular fibers are in intimate connection with the vitreous body. Vitreous fills out the bays between the teeth of the ora serrata and the angle between the overhanging edge of the retina and the inner surface of the pars ciliaris. Vitreous must therefore surround the zonular fibers running toward the end of the retina just as it does to the most posterior ones running to the pars ciliaris. In no case, however, is the demonstration given by Schoen in the appendix to his functional diseases, and his schematic Text Fig. 1 correct. In this figure one sees the border layer of the vitreous, which Schoen, like many others, called the hyaloidea, stretch wide over the retina and zonular fibers; the zonular fibers, which are differentiated by him into upper (coming from the retina) and lower (coming from the pars ciliaris) lie between the pars ciliaris and the border layer of the vitreous, therefore outside of the vitreous. Actually, just the opposite is found; immediately in front of the ora serrata the vitreous substance lies

upon the inner surface of the pars ciliaris retinae, and in meridional section, zonular fibers can only be seen farther inward, when they can be seen at all.

The vitreous body dominates the microscopical picture in this region so much, and so little can be seen of zonular fibers in a meridional section, that I can very easily understand how some authors make the general statement that the zonula does not even reach to the ora serrata. These authors have overlooked the last extensions of the zonula, which, indeed, are hard to see. However, such statements are much less removed from the truth than the statements of Schoen to the effect that the space between the border of the retina and the pars ciliaris is filled out by zonular fibers.

It is true it is of no importance for Schoen's theory of the origin of the ora serrata through the pull of the zonula, whether the union of the zonula with the retina is a direct one, as Schoen himself thinks, or an indirect one. An appearance of traction at the end of the retina could come about in the latter way, too. Whether the form of the margin of the retina can be a purely mechanical result of the zonular pull or not I have not yet been able to trust myself to form final judgment, but I incline to the view that the conditions for its formation must be more complicated, and the most important reason for this appears to me to be that the characteristic serrated form is not limited to the end of the retina, but that other structures in its neighborhood show the same form. The posterior border of the zonular fibers coming from the pars ciliaris retinae reproduces the form of the ora serrata as described and depicted above. Here the pull of the zonula cannot be the cause, because the origin of the zonular fibers is distributed uniformly over the whole border, and since the openings between the teeth are larger than the teeth themselves, we have more zonular fibers between the teeth than on them. A pull on the zonula here could only result in a uniform shifting of the whole border. Also one does not see even the slightest folding of the teeth. Such a folding would necessarily result if there were a stronger pull on one part of the zonular fibers. Furthermore, there is a striking parallelism between the ora serrata and the large mesh zone of the outer glass membrane (compare Fig. 5). In this situation the idea of a zonular pull must be wholly given up, for the zonula has altogether nothing to do with the outer glass membrane.

According to my studies, the condition is as follows: There are zonular fibers which use the posterior border layer of the vitreous for an atrium and unite with the hyaloidea; it is certain that such fibers are present in the ciliary zone of the hyaloidea. I must admit the possibility of their presence in the region of the pars ciliaris retinae, although I cannot say that I have really seen them within it. On the other hand, there certainly are fibers which enter into union with the vitreous itself, and the statements of the older authors that zonular fibers spring from the vitreous body is correct, although only in so far as it concerns their presence and not in respect to the degree in which they are found, because the fibers which can be certainly said to be of this nature are very sparsely disposed.

I would only further note that in the one eye in which these fibers could be demonstrated in greater number by serial section, this held true only for the nasal side. The fibers are the easiest to demonstrate in places where they stretch out behind the ora serrata, and this appears to me to be the case only on the nasal side.

This same eye moreover showed farther forward in the neighborhood of the anterior border layer (Fig. 11, near Z") a pretty large zonular fiber arising out of a node-like thickening of the vitreous body, and having a hook-like curve which did not, however, lie in the plane of section. There are other cross and oblique sections of zonular fibers, grouped together and occasionally shown in this region on meridional sections. These apparently belong to fibers taking their origin here, or are extensions of zonular fibers which turn round into the circular direction (Fig. 11Z", and Fig. 13 Z').

It is hard to prove this so-called origin of fibers out of the vitreous. The fibers are extremely fine, and preparations are only rarely obtained which make the condition evident. It is no wonder that they have been overlooked, and I myself have taken a long time to come to a definite judgment. The opposite holds true for those unions of the zonula with the vitreous which appear under the type of endings. It is very much to be wondered at that these have not been as well known as other details of the zonula. However, they are searched for in vain in meridional sections, and can only be shown easily and certainly on surface preparations of the anterior border layer.

They can be spoken of as endings, according to the prevailing terminology, because they are the central ends of zonular fibers, and because these fibers first break up into fibrillae in the layer to which they are attached; the condition here is similar to the union with lens capsule. On the other hand, there exist a few essential differences. The fibrillae press into the border layer itself and in so doing many of them go over into a circular direction.

The zone of the border layer in which the insertions are most often found is the coronal zone and mainly its anterior (central) part. A few also end in the circumlental zone. And, finally, some are found in the lental portion, but they are sparse and for the most part uncertain. These will be discussed separately since they are somewhat different from the others.

I will first describe the union with the coronal zone of the border layer. I have prepared the anterior border layer of ten eyes from different individuals in the manner reported above and have missed this union in no case. I can say, therefore, that I hold it for a normal finding. Of course these studies were undertaken on normal eyes, that is, eyes in which the section concerned was normal. The fact that some of the eyes showed pathological changes in the fundus, as for instance, neuritis optica, cannot have any influence here. The numbers and size of the bundles entering the border layer varies within very wide bounds; in one eye they were extremely sparse so that I could only find two or three weak fibers after a long search. In another case they were so numerous that I found at least fifty fibers ending in the border layer. These were large fibers for the most part and somewhat irregularly distributed over the entire coronal zone.

The surface view is extremely characteristic (see Fig. 12 *z'* and *z''*; and Fig. 17). One sees a large fiber or a compact little bundle reach the border layer and suddenly break up into fibrillae here. Some of these are delicate, deviate little from the original meridional direction, and are soon lost to the eye; the rest are decidedly larger and turn quickly around into the circular direction. They now course in this direction over wide stretches of the anterior border layer, oftentimes for as much as a quadrant or more. Although these circular fibers are not parallel, and cross each other at very sharp angles here and there, they are never widely separated from one another, and always course within the same relatively narrow zone. If

these fibers were spread out over the whole border layer (as I have never seen them in my preparations) they would form a narrow girdle corresponding in position to the corona ciliaris.

At the place where the fibers radiate into it, and in the region of the circular fibers, the border layer shows folds which must arise from the pull of the fibers concerned. And, moreover, the border layer is drawn backward (peripheralward) in the form of a triangular cone just at the places where the fibers are inserted (Fig. 18). This conical projection is sometimes

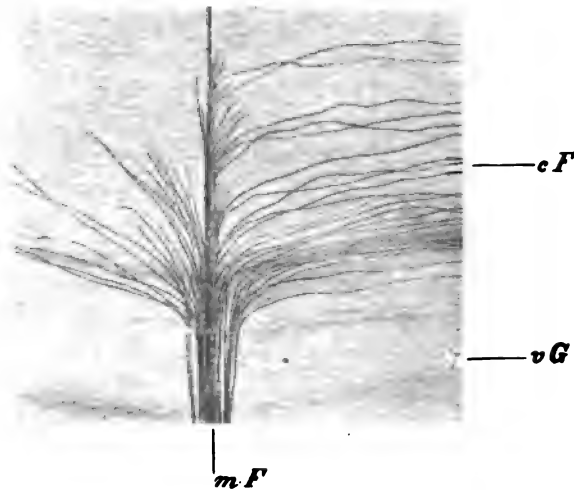


FIG. 17.—Ending of a tiny bundle of zonular fibers in the anterior border layer. Surface view magnified 200 times.

mF—Free meridionally coursing part of the bundle.

cF—Circular fibers in the

vG—Anterior border layer; only one fine fiber continues its course in the original meridional direction.

well marked, but many times only indicated by a darker streak showing a slight bend, as in Fig. 17. It is apparently caused purely by mechanical traction upon the border layer, because where no such local force could come into play, it fails, as for instance at a point where only a small part of the fibers radiate into the border layer and the rest retain their normal course. This latter frequently occurs. In Fig. 17, only one fiber of the entire bundle retains its original direction. Yet one often finds little bundles where the main mass continues farther in

the meridional direction, and only a small portion radiates into the border layer. And, too, it sometimes occurs that parts of the fibers of a given bundle go over into the border layer at two or three places a little removed from each other. The bundle is rooted to several places, in this way, somewhat as the stem of a creeping plant fastens itself firmly in the ground by successive rootlets.

The folds in the region of the circular fibrillae are deeper, more numerous and more sharply delineated than elsewhere in the border layer. These folds are much more conspicuous than the circular fibrillae themselves and it is conceivable that an unpracticed observer might regard an especially sharply de-

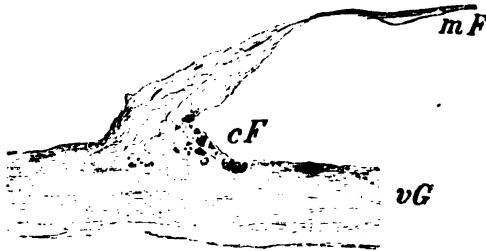


FIG. 18.—Radiation of zonular fibers into the anterior border layer of the vitreous. Meridional section. Magnified 300 times.
 mF—Meridional zonular fibers.
 cF—Circular zonular fibers.
 vG—Anterior border layer.

marked fold as a zonular fiber when studying a surface preparation. But if he follows the fold along he will come to a place sooner or later when it broadens out somewhat and disappears. In general, however, these folds are so characteristic that they presage therewith the presence of circular fibers, and one will not search in vain for these fibers in such a place with a higher power.

This folding is to be seen at z'' in Fig. 12; on account of the low power the zonular fibers themselves could not be drawn.

It is much more difficult to see these insertions in meridional sections.

I have tried many times to demonstrate them in meridional serial sections, and, indeed, in eyes in which the presence of

circular fibers showed that they were certainly present, but I could not obtain any satisfactory result.

The only preparation in which such a radiation is shown in meridional section I got by chance; it is drawn in Fig. 18: Here the meridional zonular fiber (mF) comes from the periphery and ends in a well drawn out conical projection of the anterior border layer (vG); cross-sections of circular zonular fibers (cF) lie in the border layer itself near by. The reason for this apparently is that the bundle is so broad that these fibers turn out of the meridional plane before they go over into the border layer, and in this way lie outside the plane of section. But when one only has an obliquely cut fragment of a fiber before him, it is impossible to say whether the fiber will enter the border layer or only lies in one of the many folds.



FIG. 19.—Circular zonular fibers in the markedly folded anterior border layer of the vitreous. Meridional section. Magnified 100 times.

On the other hand, the circular fibers in the border layer are very easily seen on meridional section. Since they are cut in an exact cross section they stand out clearly from the neighboring vitreous even when faintly stained. And, moreover, since they stretch out over a great part of the border layer, the chance of obtaining them in section is good, whereas the chance of finding the radiating bundle itself is very poor. I am convinced that anyone who has the meridional sections of three or four eyes will find the circular fibers in the neighborhood of the ciliary processes in at least one of the eyes.

Fig. 19 shows the usual picture of these fibers with the accompanying marked folding of the border layer. While folds of the anterior border layer elsewhere appear as simple depressions (compare Fig. 13), the folds here are deeper and more irregular, and the whole border layer seems to be thickened. In the main, the cross sections of zonular fibers corre-

spond to the valleys of the folds. Therefore it is not easy to determine whether the fibers actually lie in the border layer or at the bottoms of the folds. However, places where the border layer is unusually smooth (as in Fig. 18) prove that the fibers lie in the border layer itself.

The difficulty in following the radiating bundle of fibers in the meridional sections prevents anyone from noting anything with certainty concerning the other end of the bundle. In this respect one can obtain the following information from surface preparations.

A lesser number of these fibers, which go over into the border layer, belong to the so-called innermost zonular fibers. Like the rest, they lie in grooves of the border layer, and a pretty long fragment of the fiber is visible in the preparation (Fig. 12 z'); other fibers are branches of the usual, so to say, normal zonular fibers going to the posterior surface of the lens; a part of the fibrillae radiate into the border layer, as noted above, the remainder course on farther to the lens and cling entirely, or partially, to the border layer, as so many other fibers do. The third form is represented by very short fibers, which entirely go over into the border layer (Fig. 11 z'). One can say nothing further concerning these fibers for a certainty. Possibly they are only branches of "normal" zonular fibers torn away, possibly they are independent fibers which cut across the short course from the corona to the border layer.

I cannot forego remarking upon a finding which Retzius for the first time, and it seems to me, he only, has noted. Retzius describes a short zonular bundle of large size given off from the corona ciliaris coursing to the posterior fiber strand of the zonula and appearing to fix it. The illustration, which accompanies his description, is, like all the figures of this investigation, true to nature and beautiful in a way that has not been equaled. This illustration shows that the bundle continues a little way beyond the strand into which it should be inserted, as if its further continuation was interrupted. I am thoroughly conscious how much amiss it is to criticize the positive findings of another in such a way, and I am far from willing to deny a thing simply because I have not found it myself, even in studying a large number of preparations. And yet I cannot rid myself of the suspicion that Retzius has seen something here for which I have so far sought in vain, namely, the other end of one of those postulated short fixation-bundles which run

from the corona to the border layer of the vitreous. The place is exactly the same as that in which I have found the radiation of the bundles into the vitreous.

We must finally discuss what occurs to all of the many zonular fibrillae which radiate into the border layer. It has already been noted that a portion of them and, indeed, those which deviate a little from the meridional direction, disappear after a short course. In this case it can only be a cessation, an actual ending, of these fibrillae in the border layer.

One cannot speak with so much certainty concerning the fate of the circular fibers. They are too long to be followed with entire exactitude. It is possible and, to a certain extent, probable that they in part go over again into the meridional bundle after a greater or less distance, that they are, therefore, only fibers of union between two bundles radiating into the vitreous and so only course through the vitreous without ending in it.

The endings of the zonular fibers in the vitreous body were probably seen by some of the older authors. The details presented by them are, however, mostly treated very briefly, and as incidental matters to a certain extent. So far as fine fibers are concerned, they could well have been the so-called Campos' ligaments; as stated above, one of Berger's figures probably represents such a structure. Ulrich and Arnold possibly likewise mean the same. These authors, however, mention zonular fibers which go over from the meridional direction into the circular one, although they do not note their relation to the border layer. From the description, one obtains the impression that these observers thought that the circular fibers lie free in the zonular space, and a cut of Berger's shows them this way. I must, therefore, leave it unsettled whether the circular fibers which I have seen in the anterior border layer are meant, or the interciliary fibers in the sense described by Czermak.

I, therefore, do not imagine that I have discovered anything wholly new in the unions of the zonular fibers to the vitreous body. On the other hand, I have probably rendered the service of demonstrating that these attachments are regularly present and of describing and depicting them more elaborately and more accurately in their different forms. I have also shown the difference which exists between the direct union of the vitreous and pars ciliaris by means of vitreous fibrillae and the indirect union by means of zonular fibers.

In addition to these established and constant radiations into the border layer, I will now report some findings belonging to the category indeed, but yet which are for the most part doubtful. These are radiations into the zone of the border layer.

More or less numerous fine zonular fibers cling to the lental portion of the anterior border layer in all surface preparations. These course in a perfectly meridional direction, beyond the ligamentum hyaloidea-capsulare, about 0.5 mm., and break up then into a brush of slightly divergent fibrillae; for this reason they appear, under low power, to end in the border layer. These fibers belong apparently to the posterior zonular bundles, of which they represent last extensions, i. e., those going farthest forward toward the posterior pole of the lens. They cling to the border layer, and are, as one can see by higher power, mostly torn at their ends. Some, however, go over into a delicate homogeneous lamella, which ends peripheralwards in an irregular margin like a thin "skin" of celloidin which one has torn from a glass surface to which it has dried. Such a fiber is drawn in Fig. 12 z''', along with the homogeneous (?) lamella. It is probable that this lamella is only a part of the zonular lamella of the lens capsule, and that the appearance as a whole is not due to an actual union between zonular fibers and the border layer.

There are, however, actual unions; I have been able to find these with certainty only in one eye. Here, too, there were a few circular zonular fibers present, but they were much more sparse and not so regular in their course as in the coronal zone. One of these circular fibers could be followed out into a meridional fiber. There were also endings of fibrillae without transition into circular fibers to be seen. But, on the whole, this seems to be a rare occurrence.

Aside from this, this finding shows that the posterior zonular fiber bundle is not inserted where the vitreous touches the posterior lens surface, as one would think from meridional sections, but that it extends a considerable distance farther.

V.—TOPOGRAPHY AND ARRANGEMENT OF THE ZONULA.

The position of the zonula, the direction and distribution of its bundles, is of great importance for the mechanism of

accommodation. False conceptions in this respect can easily give rise to false conclusions concerning the accommodation process and, indeed, have actually done so.

The direction of the zonular fibers is principally influenced by the position of the lens. The shallower the anterior chamber the more sharp must the cone be which the anterior zonular fibers form, and just so much more possibility is present that the free part of the zonula will deviate from the direction of the orbicular part.

On the other hand, the tension of the zonula must be decidedly lowered by the detachment of the ciliary body from the sclera (possibly more so than ever in natural accommodation). For thereby the peripheric attachment of the zonula moves inward and approaches the lens. Moreover, the direction of the orbicular portion of the zonula would be changed thereby, and the concavity, occasionally present, of the anterior zonular bundles, straightened out.

These two changes occur very often (perhaps always in Mueller's fluid) and it would be gross error to use a permanent microscopical preparation of these structures, even if it were as perfect as possible, for forming an opinion concerning such subtle topographical relations.

In addition to this, it happens that the lens regularly draws backward somewhat from the cut surface after a meridional section of the eye, and the relations in the circumlental space are changed correspondingly. This, too, can lead to false conclusions.

It would be, therefore, of the greatest advantage for the study of the topography of the zonula, to get eyes that are as fresh as possible, and freeze them, and cut them up meridionally. Yet one can only study the grossest relations in this way; for finer details we must still depend upon cut sections. In order to preserve the relations in the best possible manner I have halved the eyes in the equator, and carefully imbedded the anterior half. Then, after the complete hardening of the celloidin in 70 per cent alcohol, the entire segment is cut meridionally. Of course, the detachment of the ciliary body and the shallow anterior chamber still remain.

Formalin does not lead to detachment of the ciliary body, but it does cause marked shrinking of the lens, so that one cannot make use of such sections either, as they are. In one eye conserved for Weigert's neuroglia stain (the solution contains

10 per cent formol) I found the thickness of the lens to be 3 mm., while that of its partner showed a thickness of 4 mm. in the fresh state.

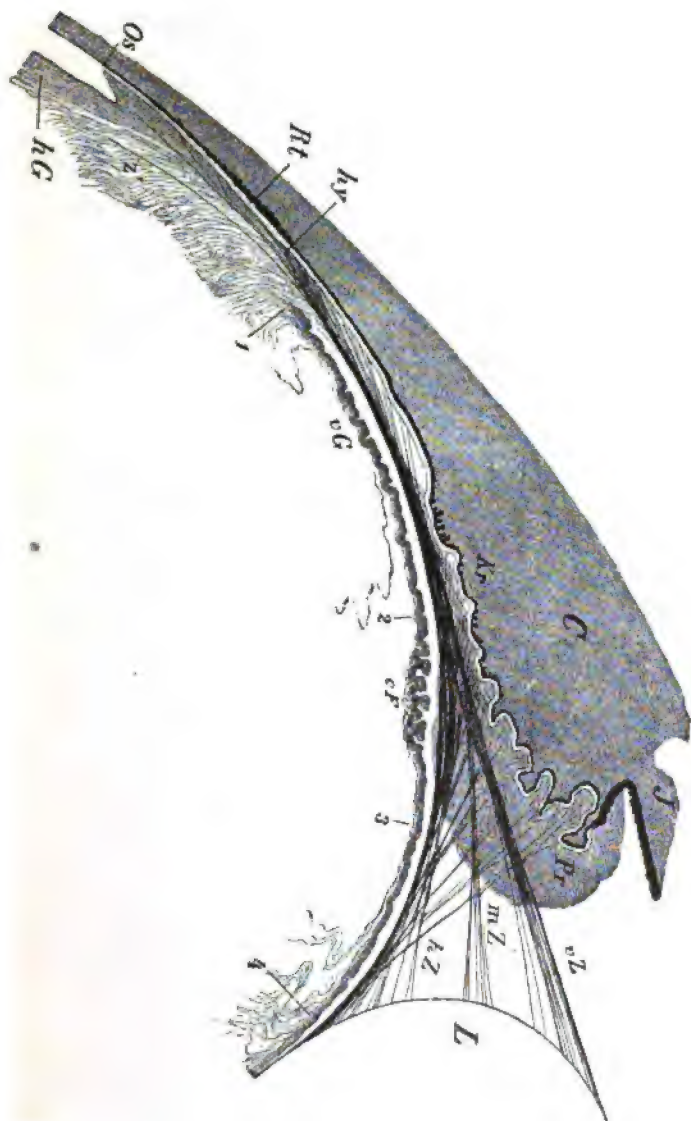


FIG. 20.—The zonula and its surroundings. Meridional section. Half schematic. Magnified twenty-four times.

C—Ciliary body; the cut surface corresponds to a ciliary valley; the neighborhood process (Pr) is shown in profile.

J—Iris root.

L—Lens.

Os—Ora serrata.

Rt—Large mesh zone of the outer glass membrane of the pars ciliaris retinae.

hG—Posterior border layer of the vitreous.

hy—Anterior end of the same. Beginning of the inner glass membrane of the pars ciliaris retinae proper (posterior border of zonula of some authors).

Kr—Crossing of the zonular fibrillae at the anterior margin of the orbiculus ciliaris.

vG—Anterior border layer of the vitreous with division into zones as follows:

1—Posterior margin of the border layer.

1-2—Orbicular zone.

2-3—Coronal zone in which are the circular zonular fibers (cF').

3-4—Circumlental zone.

4 on—Lental zone.

z'—Zonular fiber from the vitreous body.

vZ—Anterior zonular bundles.

mZ—Middle zonular bundles.

hZ—Posterior zonular bundles.

There is nothing left to do, therefore, except to make use of all methods at hand in order to eliminate errors. The relations must be first studied in fresh eyes, and then completed by microscopical preparations only in so far as they cannot be made out in the former. The typographical orientation drawing shown in Fig. 20 came about in this way.

The space in which the zonula lies is reckoned by many authors to the posterior chamber, and correctly so. However, in this conception of it the posterior chamber has a very irregular shape and for this reason alone it is desirable to further subdivide the posterior chamber. One can differentiate an anterior part, which is free from zonular fibers, the pre-zonular space of Czermak, or the posterior chamber in the stricter sense of the older anatomists who looked upon the zonula as a closed membrane, and a part traversed by zonular fibers (Czermak's zonular space). It is the latter space which interests us especially here, yet it is too complicated to be described in a few words. It is formed of the circumlental space, i. e., the space between the ridges of the ciliary processes and the equatorial zone of the lens; it is a ring-form space of some 0.5 mm. breadth, and in its cross section to a certain extent would resemble a small thick biconcave lens, if one would bridge over the anterior wall which fails. Inward, this space is bordered by the lens, backward by the anterior border layer of

the vitreous, especially by the zone of the same name; the anterior wall fails, as said, and the outer wall is formed only by the anterior halves of the ridges of ciliary processes. The broad spaces between these latter lead into the second constituent part of the zonular space, namely, the ciliary valleys (Berger's intervallary spaces). The posterior halves of the in-sinkings between every two ciliary processes are so spanned over by the anterior border layer of the vitreous (which is intimately applied to the corresponding portion of the ciliary ridges) that canal-like rooms are formed. The axis of each canal is directed meridionally, and its cross-section is quadrilateral, when one does not take into consideration the smaller irregularities of the inner surface of the ciliary body.

Backward, that is, toward the ora serrata, each canal becomes narrower, at least in a radial direction, while in the direction of the parallel circle it becomes a little broader, and finally, where the ciliary processes cease, opens into the third portion of the zonular space, namely, the orbicular space.

The ciliary valleys are actually gaping spaces; and they contain, aside from the zonular fibers, a measurable amount of fluid like the anterior chamber. In addition to this, there are facultative spaces in this zone between the ridges of the ciliary processes and the anterior border layer. One must at least conceive of such spaces if he denies a direct adhesion between these two structures, yet, in general, a measurable distance between these two structures does not exist, and where the innermost zonular fibers run between the two, there is not any more room than demanded by these fibers.

The name orbicular space has been used by Garnier to indicate the space between the ciliary body and the vitreous which contains the zonula. Garnier gave it this name because of its form, and included with it the ciliary valleys, if I understand him correctly. It seems to me, however, more to the purpose to make a special part out of that portion of the zonular space which is bordered by the orbiculus ciliaris and to give it the name orbicular space. The orbicular space again forms a closed ring, as does the circumlental space. Its breadth is 2 mm., or a little more; its section appears as a cleft possessing a width of 0.05 mm. in front at its opening into the ciliary valley, and gradually narrowing itself backward. A mold of this space would show the form of a very low truncated cone with somewhat convex sides.

The posterior limit of the orbicular space is not a sharp one, indeed, the more one approaches this limit, the more richly permeated does the room seem to be by vitreous fibrillae (the space therefore, opens behind directly into the vitreous. The inner glass membrane of the pars ciliaris retinae). At length one attains the tangle of loose fibrillae, which radiate from the ciliary zone of the posterior border layer into the body of the vitreous, i. e., one goes through the zonular fissure of the border layer into the interior of the vitreous. The orbicular space therefore, opens behind directly into the vitreous. The inner wall of this space is formed by the naked vitreous tissue, namely, the anterior border layer; and the outer wall is formed by the inner glass membrane of the pars ciliaris retinae, which is an extension of the limiting membrane between the retina and the vitreous.

One can, therefore, only reckon the orbicular space to the vitreous and, indeed, mainly on the ground of the relations of its posterior end. The structure which lies in this space, that is, the zonula, can for the same reason only be reckoned to the vitreous; and if any doubt remained, the origin out of the vitreous body and especially the easily demonstrable connections of the zonula with the anterior border layer in the region of the corona ciliaris should convince one of this connection.

It is true, the zonula shows the most relation to two cuticular structures, the lens capsule and the inner glass membrane of the pars ciliaris. In every case that is the ground on which some authors have considered the zonula as a modified part of the retina, and therefore ascribed to it an ectodermal origin. One who does not know the union with the vitreous is, of course, very near to such a conclusion. However, if one is convinced of the existence of these unions he cannot conceive of the zonula as anything else than a modified part of the vitreous body. The circumstance that it is externally in union with the cuticular structures of the secondary optic vesicle, and of the lens sacculi, can change as little our conception of it as can the union of the vitreous with its limiting membrane at the ora serrata prevent us from explaining the vitreous as something else than retina.

The origin of the vitreous itself does not come into consideration here. Of course, as long as one believes in the mesodermal origin of this tissue, one must ascribe a mesodermal derivation to the zonula also. But a variation in the conception

of the vitreous has lately arisen, which, of course, essentially influences the conception of the zonula. According to Tornatola (32) and Rabl (33) the vitreous is of ectodermal origin. In this case also it would, therefore, be much easier to understand why the zonula is united principally with unquestionable ectodermal structures in the full grown eye. By this, the statement made above to the effect that the zonula belongs to the vitreous, and not to the retina, is in nowise limited.

The zonula forms a pretty uniform layer of fibers in the orbicular space, and these increase in bulk and thickness from behind forward. The fibers are so disposed in the space that the larger fibers rather lie in the middle; between them and the inner glass membrane of the pars ciliaris retinae lie only the fine fibrillae given off from the latter. Finer fibers making up the innermost zonular fibers (inner layer of the zonula of Berger, posterior zonular bundles of Garnier) also lie along the very margin of the anterior border layer. When the border layer separates itself from the ciliary body through shrinking of the vitreous, these cling to the border layer; they are adherent to it and often press quite low furrows into the border layer, which stand out in a surface preparation as narrow, sharply delineated clear streaks (compare Fig. 12, z'''). It looks as if two layers of zonular fibers were present in the orbicular space in such a condition of detachment (Retzius). However, in the normal state, as shown in figures 4 and 14, such a division into layers is not perceivable. Therefore, not so much their position, but their adhesion to the border layer is characteristic. Besides this, they go over into the posterior zonular bundles in their further course, and toward the lens in front they are replaced by other fibers. Therefore, one does not obtain a view of them in their entire extent in surface preparations of the anterior border layer. The zonular fiber layer continues unchanged over the zone of the small folds between the orbiculus and the corôna ciliaris. Where the processes begin to appear, the fibers (except for the innermost) begin to spread apart. At this place, i. e., at the posterior margin of the corona, the mass of zonular fibers divides into as many bundles as there are ciliary valleys, and then enter the corresponding valleys. When, for instance, one removes only as much of the vitreous as is necessary to obtain a good view of the corona and anterior part of the orbiculus one sees over the orbiculus an almost uniform whitish striation, which enters

the ciliary valleys in its further course, while the ridges, or at least their posterior halves, project free over the layer of zonular fibers.

Transverse sections through the posterior margin of the corona show this very well; and when the cut processes do not project much beyond the neighboring folds, one notes that the zonular fibers are absent over the processes, which are principally characterized by their weaker pigmentation.

Only the innermost zonular fibers continue uninfluenced by the processes in a meridional direction. They often course along the ridge of the process, clamped in between it and the border layer of the vitreous (compare Fig. 15, Zi). The innermost fibers are, therefore, the only fibers which actually course along the ridges of the processes; all the others run through the valleys.*

In each ciliary valley the mass of fibers rather promptly arranges itself on cross section in the form of a U, that is, the zonular fibers spread out in a surface plane which expands along the bottoms of the valleys and up the sides of the processes a slight distance from them; aside from the slight irregularities of the inner surface of the ciliary body the zonula runs 0.1 to 0.05 mm. from the inner glass membrane of the pars ciliaris retinae on the average. The higher the ciliary processes become, the higher the fiber mass runs up on the sides of the processes. The whole mass divides itself in this way and removes itself from the greater secondary elevations in the anterior part of the ciliary valleys, that is, from the plicae ciliaris, in the same way as it did from the processes.

While, therefore, the fiber mass broadens out on a tangential surface when it enters a ciliary valley, it splits into two halves in its further course, and each half shows a warped surface, which from its curve somewhat recalls a plowshare. It is understood that the expression *surface* is not to be taken in the strict sense of the word, but only indicates the arrangement of the fibers side by side.

*"I now tend very much to the opinion that the zonular fibers apparently ending in the orbiculus do not really end there, but course through the meridional folds of the inner glass membrane, clamped in between its leaves, then emerge from the fore ends of the folds as straight coursing fibrillae of union to meet again the larger zonular fibers."

(From notes taken in Prof. Salzmann's course on "The Normal and Pathological Histology of the Eye," during the fall of 1907. E. V. L. Brown). See Fig. 21.

The fibers divide into two meridionally placed fans at their exit from the ciliary valleys into circumlental space. These fans lie very near to the ciliary processes, and in a certain sense represent their continuation. Therefore, if, after removing the iris from in front, one looks at the free part of the zonula, that is, that part which lies in the circumlental space, it seems, upon cursory examination, as if the zonular fibers run from the ciliary processes to the lens. However, it is shown even by moderate magnification (with a loupe) that the fiber bundle only stretches out along the side surface of the process to which, it is true, it appears to be fixed by fine fibrillae. But no fibers are seen to go off from the ridges of the processes.

As a result of this arrangement one must see twice as many zonular fiber-bundles in a front view as there are ciliary processes; these and the plicae ciliaris alternate between the

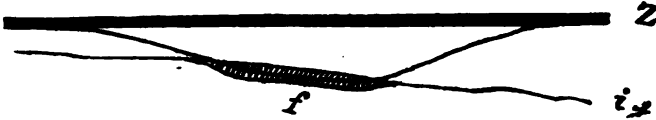


FIG. 21.—Z—Large zonular fiber.
ig—Inner glass membrane.
f—Meridional fold.

bundles. Since the individual bundles broaden out slightly into the form of brushes in their passage to the lens, the interstices thereby take on the form of narrow triangles with their apices directed toward the lens.

It does not need to be especially emphasized that this subdivision is not always carried out to the smallest details. Mathematical regularity is never to be found in organized structures. Irregularities, especially in the corona ciliaris, coincide with analogous irregularities in the arrangement of the zonular bundles.

That which appears to be a bundle of zonular fibers diverging in the form of a brush, is nothing more than the profile view of one of the above described meridional fans. The most of the fibers and the largest fibers lie at the edge of the fan and course to the surface of the lens. These fibers are most conspicuous when one studies a meridional section (it must be a strictly meridional section and not too thin). It is, therefore,

correct to speak of an anterior and posterior bundle or main train of fibers (Topolanski), or of zonular leaves, by which one is to understand the totality of all the anterior or posterior bundles.

Moreover, fibers course within such a fan of fibers; these have their insertion at the equator of the lens, or in its neighborhood, and are spoken of as a third main train of fibers, or as a middle of equatorial zonular bundle. In general, the division of the whole fan is connected with the distribution of the insertion-fibers at the lens, and all variation in this insertion must naturally also be made manifest in the bundle formation.

The fibers running to the anterior lens surface are the largest; they are the fibers which have continued farthest along the bottoms of the ciliary valleys. They course in pretty compact bundles of weakly divergent fibers through the circumlental space, and, at least the most anterior fibers become tangential to the surface of the lens.

In general, these fibers change their direction very little in their course from the orbiculus ciliaris to the anterior surface of the lens. Yet it seems to me that in a reconstruction of the natural relations, the direction of the fibers in the posterior parts of the ciliary valleys, and the direction of the most anterior fibers in the free part of the zonula, do not exactly coincide, but form a very obtuse angle which opens to the front. The vertex of this angle falls in about the middle of the ciliary processes. Schoen's concavity of the anterior leaf of the zonular fibers, therefore, is correct, although perhaps it is not so marked as this author demonstrates it, since the prolapse of the lens, as well as the sinking down of the lens toward the ciliary body, must make this concavity appear much stronger than it really is. The direction of the anterior zonular bundle is, aside from slight deviations, parallel to the inner surface of the ciliary body.

The fibers coursing to the posterior surface of the lens are not so large as those to the anterior, but more numerous. They begin to elevate themselves out of the ciliary valleys even at about the middle of the ciliary processes, and course to the lens in a curve close to the border layer of the vitreous. The strong convexity of this curve is supported on the one side by the wall which the vitreous forms around the fossa patellars; and on the other side come from the anterior ciliary valleys and engage the bow tangentially. Since now the inser-

tions are distributed over the area of a line which in the lens capsule, the whole posterior zonular bundle presents a curved form of a double fan the greater part of which is attached toward the ciliary body, the lesser part toward the lens. The comparison to an evolute is not in fact correct. The fibers springing from the ciliary body with a view to the pars ciliaris retinae, most markedly from the fibers of the anterior and middle bundles and are fixed with them at the crossing points as emphasized in Figure 1. When the entire fiber mass becomes detached as a result of the bowing, there arise slight angular bendings at these points of adhesion which can even assume the form of a V. The bow of the bowed form of the zonula ciliaris bundle and the tensions also engage the lens in a mechanical way. This line forms a very dense zonular band which is fused with the inner surface of the lens capsule.

The zone of insertion at the equator of the lens is equatorial region and even extends somewhat beyond the equator of the lens. One may speak of the zone of insertion as that portion in which the curvature of the lens is the greatest. And it is alone due to the different curvature of the anterior faces that the equator does not lie in the middle of the lens but nearer to the posterior border of a biconvex lens. At the anterior margin of the insertion zone the curvature of the anterior pole than the posterior margin of the lens. Therefore, if one draws an imaginary line between the most anterior and posterior points of insertion in a meridional section, this line is inclined toward the anterior eye in front.

The length of this cord measures 2.5 to 2.8 mm. according to the size of the lens, while the breadth of the insertion zone measured along the surface of the lens is a surface measured over the equatorial zone of the lens capsule measures from 1.5 to 2.8 mm.; in this measurement the last extensions of the zonular fibers which have already fused with the capsule are included. Therefore, a zone of 0.2 to 0.5 mm. breadth is to be included corresponding to this fusion with the capsule in front and behind. In flat lenses the zonular fibers in general appear to be fused with the capsule for a greater extent than in thick lenses. In so far as the distribution of the fibers in the inner

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correct to speak of an anterior and posterior bundle or main train of fibers (Topolanski), or of zonular leaves, by which one is to understand the totality of all the anterior or posterior bundles.

Moreover, fibers course within such a fan of fibers; these have their insertion at the equator of the lens, or in its neighborhood, and are spoken of as a third main train of fibers, or as a middle of equatorial zonular bundle. In general, the division of the whole fan is connected with the distribution of the insertion-fibers at the lens, and all variation in this insertion must naturally also be made manifest in the bundle formation.

The fibers running to the anterior lens surface are the largest; they are the fibers which have continued farthest along the bottoms of the ciliary valleys. They course in pretty compact bundles of weakly divergent fibers through the circumlental space, and, at least the most anterior fibers become tangential to the surface of the lens.

In general, these fibers change their direction very little in their course from the orbiculus ciliaris to the anterior surface of the lens. Yet it seems to me that in a reconstruction of the natural relations, the direction of the fibers in the posterior parts of the ciliary valleys, and the direction of the most anterior fibers in the free part of the zonula, do not exactly coincide, but form a very obtuse angle which opens to the front. The vertex of this angle falls in about the middle of the ciliary processes. Schoen's concavity of the anterior leaf of the zonular fibers, therefore, is correct, although perhaps it is not so marked as this author demonstrates it, since the prolapse of the lens, as well as the sinking down of the lens toward the ciliary body, must make this concavity appear much stronger than it really is. The direction of the anterior zonular bundle is, aside from slight deviations, parallel to the inner surface of the ciliary body.

The fibers coursing to the posterior surface of the lens are not so large as those to the anterior, but more numerous. They begin to elevate themselves out of the ciliary valleys even at about the middle of the ciliary processes, and course to the lens in a curve close to the border layer of the vitreous. The strong convexity of this curve is supported on the one side by the wall which the vitreous forms around the fossa patellars; and on the other side come from the anterior ciliary valleys and engage the bow tangentially. Since now the inser-

tions are distributed over the zone of some width on the lens capsule, the whole posterior zonular bundle thereby acquires the form of a double fan, the greater part of which is expanded toward the ciliary body, the lesser part toward the lens. Also the comparison to an evolute, as used by Schoen, is good. The fibers springing from the ciliary body well in front, which one may also speak of as especially long fibers of union with the pars ciliaris retinae, must naturally cross the fibers of the anterior and middle bundles and are fused with them at the crossing points as emphasized by Retzius. When, now, the entire fiber mass becomes displaced, as it usually does in hardening, there arise slight angular bendings at these points of adhesion which can even simulate anastomoses. As a result of the bowed form of the most posterior bundle their last extensions also engage the lens in a tangential plane. This line forms a very obtuse, occasionally almost a right angle with the inner surface of the ciliary body.

The zone of insertion at the lens includes the whole equatorial region and even extends somewhat over into the faces of the lens. One may speak of the equatorial zone of the lens as that portion in which the curvature in the meridional direction is much greater than that in the transverse direction. And it is alone due to the different curvature of the lens surfaces that the equator does not lie in the middle of this zone, but nearer to the posterior border of it. Corresponding to this the anterior margin of the insertion zone lies nearer to the anterior pole than the posterior margin of this zone does to the posterior pole. Therefore, if one draws an imaginary line between the most anterior and posterior points of insertion on a meridional section, this line is inclined toward the axis of the eye in front.

The length of this cord measures 1.3 to 1.5 mm., according to the size of the lens, while the breadth of the insertion zone, measured along the surface (e. g., in a surface preparation of the equatorial zone of the lens capsule), measures from 2.4 to 2.8 mm.; in this measurement the last extensions of the zonular fibers which have already fused with the capsule are included. Therefore, a zone of 0.2 to 0.5 mm. breadth is to be deducted corresponding to this fusion with the capsule in front and behind. In flat lenses the zonular fibers in general appear to be fused with the capsule for a greater extent than in thick lenses. In so far as the distribution of the fibers in the inser-

tion zone is concerned, there appear to be important differences, and I think that the statements of authors which often show fundamental variations, are principally due to this. A uniform distribution of the fibers over the entire insertion zone, as described by the older authors and also by Claeys and even by Oscar Schultze, forms the one, and a sharp separation into three leaves whose insertions into the capsule are lines (Schoen), forms the other extreme.

It is, indeed, correct that the triangular-formed space occupied by the free portion of the zonula appears uniformly filled with fibers in a one millimetre thick meridional section, yet this is due to the fact that the individual fiber-bundles are not exactly superimposed. The clearest presentation of the distribution of the fibers in the circumlental space can, however, only be given by a tangential section through this space (i. e., a section parallel to a tangent at the equator lentis). And such section shows clearly that the fibers are grouped into bundles of tufts, and that, in general, three rows of these tufts can be made out. Since, however, these tufts possess a certain thickness in all directions, and since the fibers diverge in general toward the lens, the insertions of these rows of bundles cannot be lines, but only the zones of certain breadth. These insertion zones may be at times narrow, and therefore give the impression of insertion lines. Other times they are so broad as to be confluent into a single band. Differences of age, and moreover individual differences, come into consideration here. The material lying before me is not adequate to answer these questions with certainty, yet I might point out that, in the new-born, zonular fibers also come out of the angle between the iris and the ciliary body, while in the grown-up, the anterior limit of the zonula coincides with the inner crest of the ciliary body. This example shows that the age of the individual has an influence on the number and distribution of the zonular fibers.

The typical arrangement of the zonular bundles in the free part is in three rows: Anterior, middle and posterior bundles, and corresponding to these the insertion zone is subdivided into three partial zones which are separated by interspaces of greatly varying width. The middle zonular bundles seem to show the least regularity. They are inserted sometimes farther forward, sometimes farther backward. On the other hand the anterior bundles extend forward, and the posterior bundles

extend backward, to lines which are in each case concentric to the equator.

One obtains the general impression that the marginal zonular fibers lie over two rolls, the anterior over the inner crest of the ciliary body, the posterior over the wall of the vitreous. But one must conceive of both rolls as movable; in all probability both advance inward during the act of accommodation.

From a theoretical standpoint the function of the ciliary muscle has been more than sufficiently discussed, and directly conflicting views have come about in this way. A war of words, has recently been under way between the Helmholtz theory on the one hand, and the theories of Schoen and Tscherning (34) on the other hand, and is due to this theoretical construction of the ciliary muscle function. If one would attempt further progress in this respect there would be, in my opinion, only one thing to do, namely, determine what changes the form of the ciliary body undergoes during accommodation.

Leopold Mueller (35) and Heine (36) have worked in this field with the microscopical anatomy. The former studied human eyes, the latter apes eyes. The results of the two agree in that the atropinized ciliary body represents the so-called "myopic," and the eserinizized ciliary body the "hypermetropic" type. I omit here Heine's earlier studies on pigeons' eyes because they can give no conclusions concerning the mechanism of accommodation in man.

If it is permissible in general to apply to the natural accommodation that which has been found in eyes under the influence of drugs acting on the accommodation, then it is established from these studies that the inner crest of the ciliary body advances inward and forward in accommodation. This is not the movement which the theories of Schoen and Tscherning postulate. It is, furthermore, demonstrable from Heine's drawings that that part of the inner surface of the ciliary body upon which the zonula lies, so to say, shifts itself toward the anterior surface of the lens; such a movement can only result in a relaxation of the tension of the zonula. When one now bears in mind the remarks above concerning the direction taken by the anterior and posterior bundles, one must come to the conclusion that the anterior bundles, which course almost exactly parallel to the inner surface of the ciliary body, must become more relaxed than the posterior, which form

a pretty wide angle with the directions of movement forward by the inner surface of the ciliary body, at least so far as the direction of their most anterior fibers is concerned.

In this connection one must take into consideration, too, the fixation of the zonula to the wall of the vitreous, and, indeed, its most prominent part. As the zonula glides inward, there must be, in any case, a corresponding shifting of the anterior border layer of the vitreous, and in all probability the vitreous wall becomes more steep toward the side of the lens in accommodation. This is perhaps one of the factors upon which the weaker accommodation of the posterior surface of the lens depends.

That which has mainly caused Tscherning to oppose the Helmholtz theory of accommodation might well have been the observation that the anterior surface of the lens takes on the form of a hyperbolic curve in accommodation, and that the most peripheral part of this surface is not only relatively, but actually, flattened thereby. This, thought Tscherning, could not be brought about by a relaxation of the zonula, but only through a tension of the zonula, and indeed, in the lenses of horses and oxen, he was unable to bring about a similar change of form by traction upon the zonula. The experiment is easily understandable; one brings about a moderate fold at the equator, and at the base of the fold a concavity must become noticeable, or at least a lessened, convexity.

However, the condition in these experiments on the lenses of animals are essentially other than those in the natural accommodation of the human eye. Since it is the anterior lens surface and the anterior zonular bundles which mainly come into consideration in accommodation of the human eye, such a pull as the experiments in the horse's lens reproduce, should not have been directed straight outward but always outward and backward tangential to the anterior surface of the lens at the point of insertion of the anterior zonular bundles. What part of the anterior capsule would now give way most to this traction depends upon its elasticity.

Yet it is striking that the lens capsule is thickest just where the absolute flattening should occur according to Tscherning. The thickest zone of the lens capsule lies central to the insertion of the anterior zonular bundles, and the middle of it corresponds to a circle about 4 mm. in diameter. I find the average thickness in seven lenses is here 0.025 mm., and at the

anterior pole itself it is 0.015 mm., therefore a relation of thickness of 5 to 3. These lenses were from persons of very different ages; in the young the relation seems to be even greater (almost 2 to 1), in older people less (3 to 2).

Priestly Smith (37) has furnished the data that a membrane surface of such relation of thickness undergoes the same change in form when its tension is relaxed as does the anterior surface of the lens in accommodation. It is true the lens in fresh cadaverous eyes is not focused for near as one would expect, but for distance. This fact was observed by Heine (38) and later by Tscherning (39) who used it as an argument against the model of Priestly Smith. However, one cannot give this criticism further place in view of the observation of Heine that the cutting of the zonula in cadaver eyes causes a greater convexity of the anterior pole of the lens. Tscherning's experiments only show that the force which keeps the cadaver's eye focused for distance is not to be sought for in the idea of the vitreous body nor in the elasticity of the chorioidea, but in the ciliary body itself.

All in all, one must say that the Helmholtz hypothesis still best explains the phenomenon of accommodation. It is true that it must undergo a little modification, for the position of the lens at rest is more complicated than Helmholtz could have originally supposed it.

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ABSTRACTS FROM ENGLISH OPHTHALMIC LITERATURE.

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The Value of Systematic Bacteriologic and Microscopic Study in the Treatment of Gonococcal Conjunctivitis.

OLIVER, CHARLES A., Philadelphia, Pa. (*Trans. Am. Oph Soc.*, 1907), says that for several years he has had careful smear and stain studies made not only for the sake of positive diagnosis, but during the daily progress of the disease. The result has been that the most virulent types of cases have been governed more easily, the milder ones more speedily cured and the clinically insignificant ones quickly and permanently gotten rid of. Daily or tri-weekly studies and written reports are made to the medical attendants. From the findings decision is made as to the continuance or change of treatment. The character of

no case is considered certain until the presence of the special type of germ is proved, their conditions and numbers, relation to associated germs and their exact and relative locations are taken into account, the character, degree and amount of protecting faunal cells determined and the state of the resulting debris, just before and soon after treatment, noted. No case is removed from isolation, and no treatment discontinued until at least three successive and simultaneous negative cultures have been taken. Every case is kept under strict surveillance until every external evidence has disappeared for three or four weeks. Every self-infected case is referred to the suitable department for both general and special study and treatment.

A. F. A.

Infection with the Morax-Axenfeld Diplobacillus.

TODD, FRANK C., Minneapolis, Minn. (*Ophthalmic Record*, January, 1908), reports in detail six cases of infection with the Morax-Axenfeld diplobacillus, and says that the facts brought out in the study of these cases are that the infection at first seems acute, but later becomes chronic, that in some cases there may be little or no secretion, while in others it may be profuse, that irritation and itching are prominent symptoms in mild cases, that the cornea may become involved with purulent ulcers, that the tendency to relapse shows the necessity for continuous treatment for several weeks after the case has been apparently cured. Zinc preparations are specific and the stronger preparations are most effective. A stronger sozoiodolate can be used than any other zinc preparation. Ichthyol ointment, 10 per cent., is of clinical benefit in the treatment of these affections.

O. W.

A Case of Ophthalmia Neonatorum Followed by Pyaemia and Death.

(Author's Abstract.)

LEWIS, FRANK N., New York (*Ophthalmic Record*, January, 1908), reports a case of ophthalmia neonatorum followed by pyaemia and death, in a male at the age of five weeks.

Both the father and mother were reported to have gonorrhoea.

Three days after birth inflammation appeared in both eyes, followed by the usual symptoms of ophthalmia neonatorum, the purulent discharge showing an abundance of gonococci. Both corneae were involved. Under the usual local treatment the inflammation subsided and both eyes were cured, and after four weeks no gonococci showed in ocular secretion.

While the inflammation was at its height, when the child was 17 days old, an abscess at the ankle joint was opened and examination of the pus showed an abundance of gonococci. Six or seven other abscesses formed in different joints of legs, arms and in an axilla. The pus from each contained gonococci. The child gradually lost in strength and weight, despite all efforts to keep up the nutrition. The temperature was fairly characteristic of pyaemia.

In the opinion of the writer death was caused by pyaemia resulting from the absorption of pus through the conjunctiva.

A Case of Acute Double Miliary Tuberculosis of the Conjunctiva.

HANSELL, HOWARD F., Philadelphia (*New York Medical Journal*, March 14, 1908), reports the following case: A Lithuanian, aged thirty-seven, having successfully passed the physical examination, was admitted to the United States through the port of New York in June, 1906. He stated that he had been healthy until nine weeks ago, five weeks before he applied at the Out-Patient Eye Department of the Jefferson Hospital. At this time he presented to superficial external examination the characteristic appearance of trachoma, so common among the Russians who apply at the clinic. The skin of both upper lids was discolored, and the lids were swollen and drooping. On the palpebral surface the resemblance was equally marked. Scattered over the conjunctiva of both upper and lower lids were numerous yellow, isolated swellings that might at first glance be mistaken for trachoma follicles.

Close inspection showed that the yellow patches were not granulations or enlarged follicles. They were round or oval, the size of a grain of wheat, circumscribed and sharply separated from the adjacent membrane, yellow in color as though they contained pus or caseous matter, slightly raised above the surface of the membrane and covered by epithelium. They were shallow, not penetrating as far as the tarsus. I had never seen a similar case and was uncertain as to the diagnosis. Dr. Rosenberger, of the pathological laboratory, collected some of the material from the surface of the conjunctiva by gently scraping, and reported the presence of numerous tubercle bacilli. Examination of the contents of one of the little caseous-like elevations had been commenced, but not completed. No signs of general tuberculosis could be detected by examination of the lungs, sputum or urine by Dr. d'Apery, of Dr. Cohen's medical clinic. The preauricular or cervical glands were not enlarged. The eyegrounds were healthy, V. = 6/6 with — .75s. M. L. F.

Trachoma—Clinical Aspects and Successful Treatment.

EGBERT, J. HOBART, Willimantic, Conn. (*New York Medical Journal*, March 21, 1908), claims to have obtained excellent results in certain long standing cases of trachoma, cases in the second and third stages of the disease, from massage of the tissues of the lids by rubbing the conjunctiva with a smooth glass spatula. He irrigates the conjunctiva with a warm boric acid solution, everts the lids rubs the involved portions of the conjunctiva with the glass spatula and finally irrigates the membrane again. Previous to the application of this treatment, however, he is accustomed to open and empty the individual granules with a curette. M. L. F.

An Unusual Case of Parenchymatous Keratitis.

SHOEMAKER, W. A., St. Louis, Mo. (*Amer. Journal of Ophth.*, December, 1907), gives the interesting history of an unusual case of parenchymatous keratitis occurring in a woman, age 33, with history pointing to inherited syphilis. The infiltration began at the nasal margin of the right

cornea and when first seen was 3x5 mm. in area. It gradually extended across the cornea, clearing behind as it advanced, the area involved at any one time remaining about the same.

The iris was muddy and reacted sluggishly; the vitreous presented some floating opacities.

The case lasted five months, during which time there was no ciliary injection, photophobia or lachrimation. The cornea cleared perfectly. The usual line of treatment was carried out.

G. H. W.

The Calmette Serum Reaction in Ophthalmology.

. STEPHENSON, SYDNEY (*Amer. Journal of Ophth.*, November, 1907) gives some interesting data in re the "Ophthalmic Reaction of Calmette." The cases he cites are as follows:

(a) Phlyctenular Conjunctivitis and Keratitis.

Six children—all with chronic and relapsing ulcerative keratitis; two of the six manifested tubercular lesions elsewhere. The ophthalmo-reaction was obtained in all six. One case of recent phlyctenular keratitis was negative.

(b) Chorioiditis.

Three cases; young women; two single; no history of syphilis inherited or acquired. The chorioiditis was of long standing, with nothing distinctive in the lesions. No tubercular lesions were found clinically, yet a positive reaction was obtained in all three.

(c) Interstitial Keratitis.

Eight cases, five with stigmata of inherited syphilis.

In these five the reactions were negative, in the remaining three positive.

(d) Episcleritis.

Three cases—one was positive, in which the cervical, inguinal and axillary glands were enlarged; the other two were negative.

(e) Tubercle of Iris.

One case; female, age, 12; left eye affected for six months. Anterior chamber nearly filled with a solid-looking, yellowish grey mass. Eye injected; tension—; vision, able to count figures. No clinical signs of tuberculosis or syphilis.

Reaction positive. Also had general reaction on two

ocasions following injections of 1/1000 mg. of tuberculin T. R.

(f) Tubercle of Cornea.

Female; age 12; right eye inflamed for 2 months. The history pointed to tuberculosis, but the general examination, including the X-ray, was negative. Vision-figures at two metres; tension —; photophobia; patchy ciliary redness; deposits of greyish white color at different levels in the layers of cornea, while the rest of cornea was more or less hazy.

There were no deposits on the anterior surface of iris.

Under atropine the pupil showed posterior synechiae. It was impossible to make out the fundus details.

A provisional diagnosis of tubercle of the cornea was made. Calmette reaction was positive, while 1/1000 mg. tuberculin T. R. gave a general reaction on the third injection. Two weeks later the cornea had cleared enough to allow a fundus examination which revealed yellowish-white areas of exudate in the chorioid.

(g) Chronic Irido-Cyclitis—Two Cases—Both Positive.

Stephenson found that, in cases of positive reaction, the reaction began in about three hours, had reached its maximum within six to seven hours and that all inflammatory signs disappeared within two to three days. G. H. W.

On Extraction of Cataract in the Capsule—Report of a Visit to Major Henry Smith in Jullunder, India.

KNAPP, ARNOLD (*Archives of Ophthalmology*, January, 1908) describes a visit to the Jullunder General Hospital, where he witnessed 104 cataract extractions and followed the after-treatment as far as his stay permitted. The notable points in the operation are as follows: The corneal section is somewhat larger than usual, and is entirely corneal; generally a small iridectomy is performed with the idea of avoiding iris prolapse. The speculum being removed, the upper lid is retracted with a blunt hook, the lower lid with the finger. With the patient looking straight ahead or slightly upward, pressure is exerted to dislocate the lens in its capsule. A large strabismus hook is used; pressure is applied in the lower third of the cornea, straight back if the upper pole is to present first, back and down if

the lens is to be made to present with its lower pole first; in other words, to describe a half revolution. As soon as the lens is dislocated and its greater diameter presents in the corneal section, the direction of the pressure is changed, and with the point of the hook working up the remainder of the attachment is gently loosened and the lens delivered in its capsule. Both eyes are then bandaged and the patient carried to the ward. If there is no pain the dressing is not changed before the fourth day. The patient remains in the hospital for one week. During the operation vitreous is likely to escape on two occasions, before the delivery of the lens or just as the lens leaves the eye. In the former instance pressure is kept up on the cornea and a broad spatula is plunged deep into the vitreous back of the lens, and the lens is then delivered with continued pressure on the cornea. The advantages which the successful performance of this method assures are indisputable; no secondary operations are necessary and a cataract is ready for extraction at any stage of maturity.

H. G. G.

A Rare Type of Perivasculitis Retinae in a Young Woman —The Subject of Inherited Syphilis.

OLIVER, CHARLES A., Philadelphia, Pa. (*Trans. Am. Oph. Soc.*, 1907), reports the following case: The father of the patient died of syphilitic brain tumor at the age of 35. The three other children of the family have not shown specific stigmata. The face, skull and teeth of the patient were characteristic of hereditary syphilis. At the age of 8 years she had normal vision of each eye; at 14, she showed old spots of absorption due to retinitis in the right eye; at 17, the corrected vision O. S. had fallen to $\frac{2}{7}$ of the normal and there were marks of old and new hemorrhages in the retina. The left eye has never shown any local trouble. She had a comparatively high degree of compound hypermetropic astigmatism. The ophthalmoscopic picture showed marked perivasculitis of the retina, very tortuous and irregular vessels, small superficial hemorrhages from both the smaller arteries and the finer veins, the main visible degenerative expressions predominating in the lymph channel walls of the central ret-

inal circulation, the vast area over which the engorgements of the vascular channels of both series of the central retinal circulation and the remarkable preservation of the intervening retinal elements. Subjectively may be noticed the nondisturbance of the central negative scotomata, probably due to their faintness and their relative inequalities in intensity and the nondisturbing qualities of the two physiologic blind spots in spite of their necessarily marked increases in size.

A. F. A.

Concerning the Anatomic Basis of Blindness Following Orbital Abscess.

BARTELS, DR. MARTIN, Marburg (*Archives of Ophthalmology*, January, 1908), reported the following case of orbital phlegmon at the Marburg Medical Society: A girl, twelve years of age, was operated upon for left-sided sinus thrombosis following otitis media. The mastoid contained ill smelling pus, there was an epidural abscess and a thrombotic sigmoid sinus, which was removed, and a return flow obtained. The next day the patient felt well. On the second day there was a swelling of the lids and exophthalmus on both sides, more marked on the left than on the right. Three days after the operation the eyeball was immobile, fundus normal except for pallor of the disk, the exophthalmus increased and the eyes were almost immobile in a position of divergence. This condition increased, several incisions were made until a large abscess in the temporal lobe of the brain was evacuated. Soon after the fundus showed a whitish discoloration of the entire retina, the margins of the disk were very indistinct, and on the disk in the macular region were seen horizontal linear hemorrhages. After repeated incisions the exophthalmus gradually receded. The general condition of the patient improved at first, but soon afterward there was sudden prostration, with high fever and death. The autopsy showed in addition to extensive involvement of the brain, orbital abscesses on both sides, while staphylococci, streptococci, and saprophytes were found in the pus. An examination of the orbital contents showed several large abscesses extending from the lids back to the optic foramen, lying within a funnel formed by the extrinsic muscles of

the eye. The abscesses did not press on the optic nerve. Numerous thrombotic vessels were found, and the orbital fascia was nowhere perforated. The larger veins in the posterior part of the orbit were obliterated by organized thrombi. The nerves outside the optic nerve were normal. In the central artery of the retina the portion within the lamina cribrosa was normal, but from this point the artery grew narrower as a result of an irregular thickening of the endothelium. In the following sections the artery was entirely obliterated by newly formed tissue. Numerous small arteries, narrowed by endarteritis, passed from the central artery to the nerve septa. The central retinal vein 3.5 mm. behind the lamina was thickened through small round cell infiltration, especially on the side adjacent to the artery. The vein here divided into two branches, the lumina of which were at first patent, with both branches surrounded by dense round cell infiltration. At one point the round cell infiltration disappeared and the lumen of the vein was filled with a tissue containing very few nuclei and numerous small capillaries. The vein was occluded for a distance of 1.6 mm. A short distance behind the lamina cribrosa of the nerve two small arteries were to be seen in the pia which showed a marked narrowing due to endarteritis. The adjacent peripheral zone of the nerve was necrotic, although at this place the central vessels were still normal. The intervaginal spaces were obliterated by adhesions. There was no lymph stasis. The necrosis of the nerve ended at the point where the central vessels passed outward. From this point to the optic foramen the nerve was normal. In the nerve fibre and inner nuclear layer the retina contained small hemorrhages, and between these were to be seen small vessels occluded by endothelial hypertrophy. It was impossible to judge from the preparation whether the vessels were occluded by emboli or thrombi, but the older changes in the posterior portion of the artery seemed to indicate that the densely organized occlusion, nearer the eyeball, had developed in the same way, through endarteritic changes. In conclusion, the writer sums up his deductions as follows: Blindness with orbital abscess may be caused by retrobulbar necrosis of the optic nerve, due to thrombosis of the pial vessels and thrombosis of the central vessels, in parts.

Through formation of a collateral circulation, both central vessels may regain their patency before and behind the thrombotic occlusion. Consequently, in spite of the thrombosis of the central vessels, the vessels on the papilla may appear to be normally filled.

The outer ocular muscles and nerves may remain normal, in spite of prolonged orbital abscess. H. G. G.

Primary Melanotic Spindle-Cell Sarcoma of the Corneal Limbus.

VEASEY, C. A., Philadelphia, Pa. (*Trans. Am. Oph. Soc.*, 1907), reports in full a case of sarcoma of the limbus because of its comparative rarity. Only three such cases have appeared in 520,523 out-patients in the Manchester Royal Eye Clinic and two in 44,719 at the Massachusetts Charitable Eye and Ear Infirmary. The present case was W. B.; male; 47 years old; seen October 23, 1906. He stated that there had been a small brownish spot just to the temporal side of the corneo-scleral junction for about twelve years, which had given no trouble and had not increased in size until seven weeks before, when it began to grow rapidly. There was one large growth with two lobules, covering about two-thirds of the corneal surface, ovoid in shape, was 11 mm. long, 10 mm. wide, elevated 5 mm. above the normal corneal surface and extending 1 1-2 mm. beyond the corneal limbus on the sclera. It was firmly attached to the underlying ocular structures and overlying conjunctiva, possessed no undermining edge and was dark brown in color, some portions being more deeply pigmented than others. The lower and smaller growth, or lobules, was almost horizontally oval, 10 mm. long, 6 mm. wide, elevated 5 mm. and its color a light pink. The apex was ulcerated and bled upon the least manipulation. A small portion of the pupil and approximately one-third of the cornea remained uncovered, the latter being clear and apparently unaffected in any way. The iris was of good color and appearance, the anterior chamber unaffected, the pupillary reaction prompt and the fundus normal so far as it could be seen. No family history of tumors of any kind could be elicited. Enucleation was done two days later. There had been no recurrence

up to the present time. Microscopic examination of sections showed that the pericorneal tissues in the neighborhood of the upper growth were densely infiltrated with tumor and inflammatory cells. Sections of the superior tumor showed an irregular reticulated structure. Strands of large brown cells divided the surface into larger and smaller spaces. Assisting in the formation of, and further reducing these spaces, were interlacing strands of spindle tumor cells. The lower part presented the same reticular structure above referred to. The cells in the periphery of the infiltrating mass had a large globular nucleus with a prominent nucleolus. The more densely packed cells of the central portion were of a short spindle type. Scattered throughout were small dark pigment masses. The lower growth was composed of densely packed small spindle cells and was not pigmented. In the depth of the tumors definite patulous blood-vessels were infrequently observed. Although the base of such growths is usually quite small even though the mass may become quite large, this was not true in the present case. Such growths have little tendency to involve the sclera or deep tissues of the cornea. The tendency to extend rapidly and to recur in distant parts, the patient's life being lost as the result, generally justifies enucleation at as early a date as the diagnosis can be made.

A. F. A.

Remarks on a Case of Recurrent Palsy of the Third Nerve.

FINLAY, C. E., Havana, Cuba (*Archives of Ophthalmology*, January, 1908). The clinical history of the case, which is the subject of Finlay's remarks, is briefly as follows: A strong, healthy youth of twenty-two years had suffered periodically from headaches since early youth, which always presented the form of a right hemicrania, the pain being centered around the eye of the same side. These headaches, which came on from time to time, lasted from two to three days and were always accompanied by vomiting and symptoms of general malaise and do not seem to have been preceded by any visual aura. In June, 1906, at the termination of an attack in every way similar to his previous ones, there appeared for the first time symptoms of paralysis of the third nerve; at the end of

eight days some improvement set in, which ended in complete recovery at the end of three weeks. The condition of the patient during the attack was as follows: Total and complete right ophthalmoplegia, ptosis, complete immobility of the eyeball, which was in strong abduction. The mobility upwards, downwards and inwards, as well as the elevation of the upper lid, was abolished; the pupil was dilated and immovable and the accommodation was paralyzed. The fundus was normal. For the treatment of this condition the writer employed potassium bromide and later potassium iodide and strychnine.

As this disease is a very rare condition, and dates from a comparatively recent epoch, its pathogenesis is uncertain. It occurs oftener in young adults, especially among the working classes, and its course may be divided into four stages. First stage, the patient suffers from periodic attacks of hemicrania, accompanied by vomiting, general malaise, etc., which can be differentiated from attacks of ophthalmic migraine by the absence of a visual aura. Second stage, the attacks of pain cease in a brusque manner and are followed by the onset of symptoms of paralysis, generally on the part of the third nerve, which gradually disappear. Third stage, the attacks have the same character as in the second, the difference being that a certain amount of paralysis is found to persist. Fourth stage, the paralysis is permanent and the attacks of pain recur at intervals. In the case described the patient appears to have entered the third stage. The affected nerve is commonly the third, but it has occurred in the fourth, sixth and seventh.

H. G. G.

A Case of Fleeting Paralysis of Some Ocular Muscles.

WYLER, JESSE S., Cincinnati, Ohio (*Archives of Ophthalmology*, January, 1908), details the history of a case in which a man complained of diplopia upon turning the eyes in certain directions. A former attack lasting nearly six months had occurred two years before. The patient denied specific trouble, was temperate in the use of alcohol and did not smoke. The previous history was clear. The present condition was negative. An examination of the eyes revealed an insufficiency of the inferior oblique.

The point where the diplopia was first manifested was measured upon a perimeter and found to be 35° on the horizontal arc and 12° in depression. The diplopia could be overcome laterally by a 3° prism before the eye, the inferior defect required 9° . No heterophoria was present. The conjunctiva showed a rather severe ordinary inflammation. With the exception of a small refractive error the eyes presented no ophthalmoscopic abnormalities. The treatment consisted of 1 per cent silver and the same strength zinc solutions brushed on the conjunctiva with cold compresses of boric acid solution for home use. The refractive error was corrected and instructions given to use a blind first over one eye and then over the other to avoid diplopia. Aspirin 3 grams daily was also prescribed and the galvanic current was applied three times a week to the upper inner part of the orbit. After this treatment had been continued for three weeks the muscles had fully recovered their former power and no diplopia remained. After seven months the eyes still remained in good condition. The writer considers the interesting feature of the case to be the obscured etiological element which has brought about this insufficiency twice in the same individual, although different muscles were affected.

H. G. G.

A Case of Accessory Sinus Disease with the Symptoms of an Osseous Tumor of the Orbit.

CHANCE, BURTON, Philadelphia (*New York Medical Journal*, March 14, 1908), reports a case met with in a boy fourteen years of age who had a reddened swelling at the inner side of his right orbit which was soft at first, but later became hard and began to increase in size and density though without pain. When first examined the inner half of the orbit was occupied by a bulging mass, and the eye was pushed outward and downward, and could not be rotated inwardly. The mass was dense and appeared to have its base at the nasal and lacrimal bones and along the inner orbital wall. It extended laterally into the orbit about a half inch, and it could be palpated for three-quarters of an inch horizontally backwards. It was irregularly nodular in shape, and projected forward to about

the cornea. It was not sensitive even to deep pressure. The tear ducts gave free passage to small Bowman's probes. There were no obstructions in the nasal or faucial passages, nor were there discharges on their membranes.

The tumor was supposed to be a bony growth and about a month later the following operation was performed. In the meantime the vision of the right eye had fallen somewhat, the optic disks were pale and the retinal veins engorged. An incision was made along the upper orbital margin, carried in a semicircle down over the tumor, and ended at about the middle of the lower margin. The soft parts were separated deep into the orbit. Rather free hemorrhage followed. The tumor was circumscribed and projected irregularly. In the dissection of the periosteum the instrument suddenly penetrated the bone and a bead of thick tenacious mucus exuded. This opening was at once enlarged to the full size of the tumor. An almost incredible amount of thick mucus was removed before the cavity could be exposed; then it was found that the ethmoidal sinus had been entered. The cells had been absorbed so that exploration was carried on easily. The cavity extended back to the sphenoid, up to the frontal sinus, and the inner concavity to beyond the median line, while the outer wall projected far into the orbit. The walls were scraped; and as there was no opening into the nose, one was made with the curette. Two rubber drainage tubes were inserted, one far back into the cavity, the other upwards and forwards, and brought out through the nostril. The soft tissues were placed over the orbital opening, and the wound was closed by several silk sutures. The dressings included the tubes.

The patient recovered promptly, and no untoward events occurred. The cavity was douched daily with solutions of hydrogen dioxide. After six days the tubes were withdrawn, and the sutures were removed, so that in eight days the boy was able to come to my office for treatment. The aperture in the ethmoid allowed free drainage to continue into the nose.

For about four weeks the external cicatrix remained prominent, but it became reduced when the osseous aperture began to be filled in. Two months later the sinus

was draining satisfactorily, though a plug of mucus was held in the opening; and, when deep pressure was made over the orbital opening a bubbling sound was emitted as though there was an accumulation of mucus. The boy stated there was no noticeable discharge from his nose. He had great comfort. The eye had become straight again; he was relieved of the diplopia, and the vision had returned to normal. The optic nerve had lost its pallor, and in all respects the fundus appeared to be as healthy as that of the other eye.

Nearly three years later nothing but the cutaneous cicatrix and a rather broad nasal bridge gave external signs of the former state, while the visual and ocular conditions were normal, and the nasal cavities were healthy.

M. L. F.

Optic Neuritis After Disease of the Posterior Ethmoidal Cells.

KNAPP, ARNOLD (*Archives of Ophthalmology*, January, 1908) L. B., nineteen years of age, was seen on December 1, 1905, with the history that two weeks before the sight in the right eye had become suddenly affected, and he had suffered from nausea and frontal headache. An examination of the right eye revealed a picture of pronounced neuro-retinitis with a radiating figure of white dots about the macula. $V=20/70$. Periphery of fundus normal. Central relative scotoma for white and colors of 5° . No pain on moving the eyeball. The left eye was normal. The nose presented the condition of ozaena. The lower turbinates were atrophic; the middle turbinates were small, wedged up against the septum, and covered with scabs and pus. The day following an operation on the nose for the escape of pus the vision had improved to $20/50$ and there was less circulatory disturbance in the papilla. Subsequently the middle turbinate was removed and the posterior ethmoidal cells opened up; the discharge came from this region. In the course of the next few weeks the vision gradually returned and the discharge from the ethmoidal cells diminished. After seven weeks the sight became normal and the eyeground had resumed its healthy aspect. As a point of particular interest, the

writer calls attention to the central scotoma which always seems to be present if the case is examined early enough, and the optic nerve lesion falls into the group of retrobulbar neuritis.

H. G. G.

Attempts to Repair the Effects of Great Destruction of the Lids and Orbital Tissues Caused by Disease of the Antrum.

CHANCE, BURTON, Philadelphia (*New York Medical Journal*, April 18, 1908), reports a case in which a young woman had had a disease of the left antrum, probably caused by infection from a decayed molar tooth. The disease spread to the orbit, caused orbital cellulitis followed by panophthalmitis which necessitated enucleation. Abscesses also formed in the lids. The antrum was opened and curetted, the abscesses were opened, the other sinuses explored. The resultant appearance is thus described by Chance:

On her cheek were several scars; one as though it were the cicatrix of an incision, others as though from excoriations, while along the superior orbital ridge were those from the exploratory incisions over the frontal and ethmoidal regions. The globe had been removed. The orbit was partially filled in by soft tissues adherent to the muscular pyramid. There was sufficient movement of the mass to justify the assumption that the ocular muscles had not been entirely destroyed. The upper lid, which was greatly distorted and stretched, was firmly adherent to the roof of the orbit. The inner two-thirds were without lashes or ciliary border; the outer third was puckered, and from the edge projected distorted cilia. The lower lid had been drawn downwards, and with the skin and fascia had become firmly adherent to the orbital border. Here surrounded by numerous radiating cicatricial bands was a sinus leading from a pocket in the orbit and discharging on the cheek. The antrum was drained by a small opening into the nasal cavity, and through the socket of a molar tooth into the mouth. Fetid pus exuded from all these sinuous tracts.

Extensive plastic operations were performed in an attempt to produce a more sightly condition.

M. L. F.

The Eye and the Pelvis.

FRANKLIN, CLARENCE PAYNE, Philadelphia (*Ophthalmic Record*, Jan., 1908), writing of the relations between the pathological conditions of the eye and the pelvis, says that the most casual inspection will show that causes in the one may produce effects in the other. He asserts that according to his experience any existing inflammation of the eyes is aggravated during menstruation. He refers to the various disturbances presented during the menstrual period, and thinks it probable that the relation between these organs is best shown in the albuminuric retinitis of pregnancy, and that embolism of the central artery of the retina could be placed under the same heading when due to the puerperal state, and also that glaucoma and the menopause are related. He refers to the possible changes in refraction caused by the artificial menopause produced by the removal of the ovaries. He claims that retinal asthenopia may occur in a nervous patient, and is to be considered from a pelvic point of view where there are no other apparent causes, that endometritis may cause all the symptoms of asthenopia, with photophobia and occipital headaches, that trachoma infection may be a cause of kraurosis vulvae and that temporary amblyopia is sometimes a secondary symptom of neuralgia of the ovary. O. W.

A Case of Belladonna Poisoning.

EBERHARDT, W., Michigan City (*Ophthalmic Record*, January, 1908), reports a case of belladonna poisoning in a girl twelve years old. Two days previously the patient had come for refraction, and two gelatine discs containing 1/50 gr. of homatropine and the same quantity of cocaine placed within the conjunctival sac within a half hour produced only a slight dilatation of the pupil. The patient was dismissed, and returned two days later, complaining of not being able to see close by. In order to obtain a full dilatation of the pupil a watery solution of atropine sulph., gr. 1-3ii, four drops in each eye within an hour was used. Even this, supplemented by a homatropine disc in each eye, failed to dilate the pupil, but effectually paralyzed the accommodation. When she left the office

there were no unusual symptoms, but two hours later she was delirious and very restless; her pulse was 150, her skin dry and cool, her lips and throat dry and her breath offensive. The eyes were bright and staring and only moderately dilated. All of these symptoms appeared soon after she left the office.

Cold applications to the head and an injection of 1/10 gr. of pilocarpine failed to relieve the conditions and three hours later another injection of pilocarpine was made. A solution containing 1/4 gr. of morphine dissolved in ten spoonfuls of water was given with directions to administer a spoonful every half hour until she slept. The delirium lasted until 3 o'clock in the morning, when she finally slept. When she awoke she was still slightly delirious, but soon recovered her normal condition.

O. W.

A Knife Guard to Aid in the Tarsal Subsection.

EWING, ARTHUR E., St. Louis (*Ophthalmic Record*, January, 1908), in an illustrated article describes the placing of the sutures in the stitching of the conjunctiva into the bottom of the wound made by the subsection of the tarsus and the tying of the sutures upon the skin surface, and says that as a further aid to the forceps designed for keeping the lid in an everted position, and in keeping the incision throughout its full length an even distance from the margin of the lid, he has added a guard to the knife designed by Dr. Greene, for the subsection, the action of which is to move along the border of the lid as the incision is made and hold the edge of the knife at a definite distance from the lid margin. This guard is placed parallel to the knife, 2.27 to 3 mm. from the edge as seen from before backwards, and extends 2 mm. beyond the edge as seen from the side, except at the point, where it is shortened, in order, not to interfere with the incision being extended well into the angles. It is 3 mm. in width and the back is curved so as not to obstruct the view of the operator. It may be attached to any knife used in this incision.

O. W.

ABSTRACTS FROM ENGLISH OPHTHALMIC LITERATURE.

(GREAT BRITAIN AND THE ENGLISH COLONIES.)

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Some Notes and Observations on Three Hundred and Ten Consecutive Operations for Extirpation of the Lachrymal Sac.

ELLIOT, MAJOR R. H., M. D., B. S. (Lond.), D. Sc. (Edin.),
F. R. C. S. (Eng.), Superintendent of the Gov. Ophthalmic
Hospital, Madras. (*Ophthalmic Review*, February, 1908.)

After mentioning the report of forty-seven operations
published in the *Indian Medical Gazette*, August, 1905,
the author presents his results in 310 consecutive opera-
tions for the removal of the lachrymal sac. These opera-
tions were performed in hospital and private practice in
Madras between May 5, 1904, and October 8, 1907. The
relief afforded, the author claims, may be gauged by the
increasing popularity of the operation. In 1904-5 forty-
seven cases, in 1905-6 ninety-eight cases, in 1906-7 125

cases. The operation was performed for the first time in South India in 1905.

INDICATIONS FOR EXTIRPATION OF THE SAC, in the presence of lachrymal obstruction or dacryocystitis:

- (1) Dilation of the sac.
- (2) Purulence of the sac-contents.
- (3) Evidence of previous attacks of phlegmonous dacryocystitis, with persistence of the stricture.
- (4) A history of long-standing obstruction, combined with inability or unwillingness on the part of the patient to submit to a long course of probe-treatment; or, with a timidity which renders it unlikely that such treatment will be persevered in.
- (5) The presence of any indication for an operation on the globe of the eye (especially cataract).
- (6) The presence of a septic ulcer in the eye of the same side.
- (7) Any factor, occupational or otherwise, which increases the liability of the patient to eye-injury. Not a few of our cases of septic ulcer of the cornea in Madras occur amongst fitters, goldsmiths and stonemasons; in all of the above, and in many allied trades, tiny chips of hard substances frequently fly up and injure the cornea.
- (8) The existence of double lachrymal obstruction, with evidence of past or present mischief in one cornea, is a strong indication for the removal of both sacs.

It would be almost easier to point out the indications for the old and conservative methods of dealing with lachrymal obstruction and dacryocystitis. They may be stated as follows:

- (i) The absence of inflammatory or marked structural changes in the passages; and
- (ii) On the part of the subject, (1) the courage and patience to persevere through a long, tedious and painful course of treatment, and (2) the means and the leisure to give the necessary time required by the surgeon.

In other words, given an early simple case, in a man of means and leisure, we may adopt conservative treatment, always with the proviso, that failing success, we fall back on extirpation of the sac.

A rough diagram is added showing the position of table, operator, assistants, etc. The head of the patient should

be toward the window, the operating table inclining at an angle of about 45 degrees in reference to the plane of the window, to the right or left according as the right or left sac is to be removed.

STEPS OF THE OPERATION.

Preliminaries.—The patient is prepared in the usual way and chloroform administered. The sac is squeezed dry of its contents, which are removed and face again washed. The detailed description of the operation is given in full.

(1) *Skin Incision.*—Define the internal palpebral ligaments by pulling the lids outwards; and make the lower border of this the upper limit of the incision; it is practically never necessary to divide this ligament, and it is most advisable not to do so, as when it is divided there is a risk of deformity after healing. Next, define with the finger the anterior lip of the lachrymal groove, and cut boldly down on this, following its course with a crescentic incision, first downwards and then outwards. The average length of incision in the 310 cases was 20 mm. Easy cases only require an incision 15 to 18 mm. long, whilst matted tissues demand much more room (the maximum in any case being 27 mm.).

(2) After separating the lips of the wound by the aid of a Muller's retractor, define the layer of fascia which closes in the lachrymal groove, and divide this throughout the length of the skin incision. This may usually be done with the end of a small sharp elevator. With the same instrument, the sac is separated from the adjacent bone, internally and posteriorly. If not adherent, the sac may also be cleaned with the elevator on its outer side as well, up to the point of entrance of the canaliculi.

(3) The dome of the sac is seized with a fine pair of forceps (conjunctival forceps do well) and drawn firmly downwards, whilst a pair of blunt-pointed scissors, curved on the flat, is used to free the dome from its upper attachments (working under the palpebral ligament for this purpose), to cut through the canaliculi, and to follow the sac down into the nasal duct; this duct is divided as low as possible, the sac being pulled firmly up for the purpose.

(4) As large a probe as possible (Nos. 9 to 12 Theobald) is then thrust down the nasal duct till stopped by the palate, pushing any mucous membrane in front of it, and a red-hot spindle-shaped cautery is thrust boldly down the duct, to insure the destruction of this membrane.

(5) The cavity is dried and examined. The removed sac is carefully examined under water and slit open to make sure that no part has been left behind. If any portions have been so left they are dissected out; and if necessary the neighborhood or the dome of the wound is cauterized freely with a ball-shaped red-hot cautery.

(6) The cavity is freely flushed with a 1/3000 solution of biniodide of mercury, and the wound closed with three skin sutures. An aseptic pad and bandage closes the eye of the operated side, the other being left free.

The case is dressed on the seventh day, when the stitches are removed and the eye is released.

Hemorrhage is dealt with by means of pressure, adrenalin chloride solution, or if troublesome, with the red-hot cautery.

If an ulcer of the cornea is present it, too, is cauterized; together with paracentesis of the chamber. Such cases are treated daily with protargol solution (1 to 8); atropine or eserine is used as indicated.

Complications Met With Before Operation:

(1) Acute abscess of lachrymal sac, with phlegmonous inflammation of surrounding face.

(2) Lachrymal fistula.

(3) Ulcer of the cornea, especially of the septic type.

(4) Cataract or other deep-seated disease of the eye.

Lachrymal abscesses are freely incised and the cavity curetted and sponged with a solution of perchloride of mercury (1 per cent). When the inflammation has subsided the sac can be removed, as a rule, in about one month.

Difficulties and Complications Met With During the Operation:

(i) The terminal branch of the facial artery should be avoided.

(ii) The sac may be bound down in the lachrymal groove by a dense fascia, which appears to be a backward reflec-

tion from the tendo palpebrarum. When the bridge of the nose is high, the plane of the fascia comes to lie nearly parallel to the median sagittal plane; when low, the flattened type of the face throws this fascial plane farther forward, and the sac is more accessible. Accidents may be avoided if after a first clean skin incision, the wound is held well open (by a speculum or otherwise), all hemorrhage is stopped, the nasal margin of the lachrymal groove is well defined with the finger, and the dense fascia cleanly divided as close to this bony edge as possible.

(iii) The hemorrhage which may be free (1) after the skin incision, (2) after division of the deep fascia over the sac, or during separation of the sac, or (3) from the nasal duct after the passage of the probe, may be controlled by pressure or cautery passing a spindle-shaped cautery down the passage after drying with cotton swab.

(iv) In case of preceding phlegmonous inflammation, or long-standing fistula, it may be difficult to recognize the sac itself. If one cuts boldly down on the anterior crest of the lachrymal groove and separates the sac from the bed of the groove, the thickened sac wall can be seized by fixation forceps and the sac cut out together with the surrounding structures.

(v) When one desires to operate on the globe of the eye, and the lachrymal passages are found ("as tested by dropping fluorescein into the conjunctival sac and examining a handkerchief into which the patient has strongly blown his nose") to be closed, the writer thinks it is safer to remove the sac before undertaking the intraocular operation.

The writer makes the rule to consider that if the cavity does not look clean after the operation, that the whole of the sac has not been removed. The use of paraffin he considers not necessary after a limited experience. He also thinks the difficulties of the operation have been overestimated. Out of 325 extirpations performed during the last three and one-half years, there has been only one in which it was necessary to operate a second time on account of a portion of the sac wall having been left behind.

(vi) When there is deep ulceration of the cornea compli-

cating the case, excessive pressure on the globe should be avoided for fear of rupture.

Complications Met With After Operation:

(1) Recurrence of retention, due to a portion of the sac wall having been left behind at the operation. This occurred only once and in the fourth case of the series. It has already been dealt with.

(2) Failure to obtain primary union of the wound, or breaking down of the wound after primary union appeared to have been established.

(3) Progress of the septic ulceration of the cornea for which the operation was undertaken.

(4) A chronic catarrhal condition of the lower lid, which is difficult to treat, but which yields eventually to patient treatment along the ordinary lines; it is better not to be too active.

Statistics of 310 operations for removal of the sac.

Aged 1 to 20.....20 patients, or 8.51%

Aged 21 to 30.....30 patients, or 12.77%

Aged 31 to 40.....32 patients, or 13.62%

Aged 41 to 50.....84 patients, or 35.74%

Aged 50 and above.....69 patients, or 29.36%

(2) Sex Incidence: 118 were males, 117 females.

(3) Side Affected: Right 159, left 151.

(4) Period Elapsing Between Patient First Noticing Disease and Coming to Hospital.

Under 1 year.....156 cases, or 50.32%

1 to 2 years.....63 cases, or 20.32%

2 to 3 years.....35 cases, or 11.29%

3 to 4 years.....8 cases, or 2.58%

4 to 5 years.....17 cases, or 5.49%

Over 5 years.....31 cases, or 10.00%

The histories are very unreliable, and probably greatly understate the duration of the disease of a large number of the cases.

(5) Course of the Disease.

Chronic cases in which there had at no time been abscess formation.....258, or 83.22%

Chronic cases in which there had at same time been abscess formation.....39, or 12.58%

Acute cases presenting themselves with phlegmonous inflammation..... 13, or 4.19%

Number of cases complicated with fistula.. 32, or 10.32%

(6) Number of cases in which at the time of discharge the patients appeared to have been cured or relieved by the operation.....308, or 99.36%

Number of cases in which the operation failed to relieve the condition for which it was performed..... 2, or 0.64%

Number of cases in which, though the patient left hospital relieved, it was known that the case subsequently ended in disaster..... 1, or 0.32%

(7) Indications for extirpation of the lachrymal sac recognized in the 310 operations under review. It is to be taken for granted that lachrymal obstruction or dacryocystitis, or both, were found in every one of the 310 eyes:

(1) Presence of septic ulcer of cornea.....45, or 14.52%

(2) Presence of the combination of corneal septic ulcer and lachrymal mischief in the opposite eye..12, or 3.87%

(3) Evidence that in the past there had been a combination of severe corneal inflammation, and lachrymal mischief in the opposite eye 2, or 0.64%

(4) Special liability to injury 22, or 7.09%

(5) Dilatation of sac172, or 55.48%

(6) Purulence of sac-contents151

Muco-purulence of sac-contents....41 to 192, or 61.93%

(7) History of previous attacks of phlegmonous dacryocystitis.....52, or 16.77%

(8) Presence of a fistula.....32, or 10.32%

(9) Presence of cataract83, or 26.78%

(10) Residence outside Madras (taken on the 235 patients.....152, or 64.68%

(8) Average time for operation taken in the last 150 cases9.5 minutes

Considering only the last 150 cases the following conditions were observed:

(1) The fascia which closes in the lachrymal groove was a dense, definite membrane, and could be recognized as such in 118 operations, or 78.6%.

The above fascia was so thin as to be unrecognizable or nearly so in 16 operations, or 10.6%.

The parts were so matted that no definite structures could be separately recognized in 16 operations, or 10.6%.

(2) The sac bulged into the wound and could be at once recognized on the completion of the skin incision in 53 cases, or 35.3%.

The sac did not so present in 97 cases, or 64.6%.

(3) The sac was thick-walled in 116 instances, or 77.3%. It was average or thin-walled in 34 instances, or 22.6%.

The sac was adherent to the surrounding parts in 137 instances, or 91.3% ; free from adhesions in 13 instances, or 8.6%.

The sac was dilated in 75 instances, or 50% ; not markedly dilated in 37 instances, 24.6% ; distinctly contracted in 38 instances, or 25.3%.

(4) The number of sacs removed entire was 107, or 71.3% ; removed in pieces was 43, or 28.6%.

(5) The number of cases in which the nasal duct was patent was 108, or 72% ; occluded was 42, or 28%. The number of cases in which the lower end of the sac was patent was 99, or 66% ; did not appear to be patent was 51, or 24%.

(6) The number of cases in which the nasal duct was alone cauterized was 76 or 50.6% ; the nasal duct and the dome of the wound were both cauterized was 73, or 48.6% ; the dome of the wound was alone cauterized was 1, or 0.6%.

(7) The number of cases in which the adjacent bone was healthy was 80, or 53.3% ; carious was 70, or 46.6%.

(8) Number of wounds which healed by first intention 146, or 97.33% ; in which primary union failed, or in which the wound subsequently broke down 4, or 2.66%.

As bearing on the delayed healing in these four cases the following points are to be noted :

(1) 75% of these cases occurred in children ; whereas of the total number of cases under review, only 8.51% were below 20 years of age. Possibly the children were more prone to interfere with their dressings.

(2) In two cases the sac was dilated (50%).

(3) The sac contents were purulent in three cases (75%).

(4) There had been previous lachrymal abscess in two

cases, and there was a fistula at the time of operation in both (50%).

(5) In two cases the wound failed to heal till past the fiftieth day, and in both of these, healing took place as soon as some spicules of bone had been expelled (50%).

(6) The other two cases healed on the ninth and twelfth days respectively. The latter is the only case in which no definite factor obstructing healing can be traced, but the patient's age (60) may be borne in mind.

(9) Of 118 softer ulcers of the cornea admitted to the hospital 14.4% were complicated with lachrymal mischief.

No bacteriological study was made of the cases reported, but a pathological investigation seems to confirm the following observation:

(1) Tubercle is not responsible.

(2) The well-formed follicles shown in the sac lining suggests the possibility of trachoma as a causative factor.

In conclusion, the author suggests that, as the nerve supply of gland, passages, cornea and conjunctiva is from one and the same source, the removal of the cause of the inflamed passages relieves the whole lachrymal system of the previously existing irritation and excitation.

W. R. P.

A Report of the Comparative Action of Homatropine, Menthyl Bromide, and Momatropine Bromide as a Mydriatic.

BATTEN, RAYNER D., London (*Ophthalmic Review*, January, 1908). The author made a short series of experiments on the comparative action of homatropine, menthyl bromide, and homatropine bromide, with a view of testing the action of the former as a mydriatic.

The chief points to be determined were:

1. Its rapidity as a dilator.
2. The duration of the dilatation.

After quoting results of experiments made by Mr. H. H. Dale on cats' eyes, he proceeds to analyze his own results on the human eye.

He made two classes of experiments; one in which the drug was applied to one eye; and a second where the com-

parative action of the two drugs was tried, one drug being applied to each eye. Following are his results:

1. H. M. B. in a 1 per cent. solution produces nearly full dilatation in times varying from thirty minutes to one hour. Its action in this strength is not so prompt as that of H. B., but in a 2 per cent. solution its action is fully as rapid.

2. The full dilatation with H. M. B. lasts from 2-4 hours, after which it passes off with far greater rapidity than is the case with H. B., the full dilatation of the latter often lasting 10-12 hours, and then only passing off gradually, the pupil not returning to the normal for from 36-38 hours; whereas, with H. M. B. the dilatation often passes off completely, with a 1 per cent. solution in 5-9 hours, or with a 2 per cent. solution in about 16 hours.

In testing the comparative action of the two drugs, when I applied them to the two eyes at the same time it was interesting to note that the dilatation of the one eye with H. B. generally delayed the return to normal in the H. M. B. eye by some hours. In one case, however, the effort to overcome the dilatation appeared to stimulate the power of contraction in the other eye, so that it was smaller than its usual normal.

The inconvenience caused to the patient by the use of H. M. B. is, therefore, far less than that caused by H. B., and in some patients begins to pass off in less than three hours.

He found that the dilatation lasts considerably longer in young patients than in adults or elderly people.

Curves representing the comparative action of the drugs are plotted and shown in four diagrams. W. R. P.

On the Use of Staphylococcic Vaccine in the Treatment of Hypopyon-Ulcer.

EDWARDS, H. GRAY (*Ophthalmoscope*, February, 1908). The author speaks of the great amount of work that has been done during the last few years in the treatment of bacterial disease through the injections of serums and recently the use of vaccines after the discoveries of Sir A. E. Wright.

Darier and others have treated infected ulcers of the

cornea by injection of various anti-toxins, but the use of vaccine has not been used.

In the November number of the *Ophthalmoscope* the author reported a case of hypopyon-ulcer treated successfully by subconjunctival injections. Since that time he has treated two very bad (more or less chronic) in feeble old men, where subconjunctival treatment was not successful, but where the injection of dead vaccine proved most successful.

The first case, a man aged 66, feeble health, was suffering from a large hypopyon extending over about a sixth of the cornea. The anterior chamber was about half full of pus. The pus was evacuated and subconjunctival injection bichloride of mercury given, boric lotion prescribed and dionin to be used for pain. No improvement. After four weeks eye much the same. At this time staphylococcic vaccine containing 250,000,000 dead cocci was injected into the cellular tissue above the right scapula. Two days later the formation of pus ceased and the ulcer healed rapidly.

The vaccine was obtained from a culture of pus on agar, taken from an acne pustule on the face of another patient.

The second case, male, aged 66. A hypopyon ulcer followed being struck in eye by a stone two weeks previously. The same treatment as in case one was carried out for ten days. As no improvement followed, 100,000,000 of the same vaccine as was used in case one was injected. The result was as marked as in the first case. In three days pus had ceased to form and the eye was clearing up.

These two cases appear to the author to be "quite clear as to cause and effect." Especially the first one, which had resisted all treatment for a month.

A third case, male, aged 46, had a long narrow ulcer at the upper margin of the cornea following an injury three months previously. Three days later a line of pus could be seen in the anterior chamber. He was given a small dose of vaccine same as above. Six days later pus had increased, when another dose of the same vaccine was given. The seventh day there was no change. A fresh vaccine was made and another dose given at this time. Three days later marked improvement and convalescence was rapid.

In conclusion the author adds: "Although I feel sure that a subconjunctival injection is capable of hastening absorption, I am anxious, in future cases, to employ vaccine inoculation alone.

Looking backward at these three cases, and believing, as I do firmly, in the rationale of Wright's treatment of bacterial diseases generally, I shall approach any cases of hypopyon ulcer which may come under my care in the future with a much greater degree of confidence than I have in the past."

W. R. P.

A Monocular Method of the Correction of Ametropia.

DUNN, PERCY, London (*Ophthalmoscope*, February, 1908). In order to avoid expense and inconvenience to his patients, the author purposes to substitute for bifocal lenses, glasses, one lens of which is adjusted for near and one for distance vision. In speaking of the use of bifocal lenses, he says only a small proportion of patients to whom these are given are satisfied. In his own experience he says they are most frequently neglected. On the other hand, he claims perfect results by his monocular method in all cases of presbyopic hypermetropes, and he is about to try it on myopes and astigmatics.

NOTE.—The author's experience certainly does not agree with that of the majority of ophthalmic surgeons in this country. Very few of our patients are unable to wear bifocals. It would seem, too, that a monocular habit would be more difficult to acquire than would the use of bifocals.

W. R. P.

Three Cases of Serious Visual Deficiency Affecting Responsible Employees in the Marine and Railway Services.

GALLOWAY, A. RUDOLF. The first case is one of tobacco amblyopia occurring in the captain of a government cruiser. He had the usual central scotoma for red, green and blue and his vision was reduced to 6/60 in each eye.

The second case was one of color blindness in a captain of a trawler sailing from Aberdeen.

The third case, an engineer, a compound myope whose vision in each eye was $6/36$. With $s - 1.00 = c - 1.00 \times 90$ $V = 6/6$. After giving a detailed history of the above three cases, the author makes the following remarks:

"In considering these three cases, which occurred in my practice within a period of about three weeks, we are brought forcibly to the conclusion that there is something far wrong in the manner of testing the eyesight of those on whom the lives of so many depend, and we also see in actual operation the forces that may be accountable, although they may not then be discovered, for serious accident in the future.

So many accidents have occurred recently, both at sea and on land, that the public is seriously alarmed, and the companies concerned, in their own interests, will have to take action in the direction of properly qualified, expert and periodic examination of their employes.

Tobacco blindness, frequent among sailors, and also railway officials, may develop in a few weeks' time and totally incapacitate the individual affected from seeing at the proper distance green and red signals—the two colors on the correct interpretation of which the lives of the traveling public may literally be said to depend.

Yet in all the cases of tobacco blindness among such persons which I have seen, I have been consulted by the patient on his own account and had no assurance that the individual affected suspended, in any case, even temporarily, his responsible occupation.

The question may be asked in cases such as these, whether it is not the duty of the consultant either in his private capacity, or as surgeon to a public institution, to inform the employers of the existence of such defective servants, whose disbelief in their own visual powers is seldom strong enough to cause them to seek relief from duty.

Some medical men have informed me that I should be partly responsible for any accident that might happen as the result of these non-reported cases.

But it seems to me, that any system of eyesight examination which is entrusted entirely to lay representatives of the board of trade, locomotive foremen and other per-

sons, without medical knowledge, and also any that is not periodically repeated; in the case, at least, of the more responsible employes, is so essentially defective, that most good will result by drawing attention to actual cases such as those I have reported to-night." W. R. P.

Night Blindness.

PARSONS, J. HERBERT (*The Lancet*, February 23, 1908). The ring scotoma sometimes found in the early stages of retinitis pigmentosa is seldom complete, but is dotted over with areas in which vision is only partly lost. These areas are probably closely related to the distribution of the vessels. There are several forms of night blindness.

The so-called idiopathic retinitis pigmentosa which is the slowly progressive form of night blindness is the most important form. Heredity and consanguinity of parents play a considerable part in it. Chorio-capillaris of the chorioid seems to be first attacked, the retinal degeneration being secondary. The outer layers of the retina are nourished by this chorio-capillaris and in retinal pigmentosa the inner layers show comparatively little change.

In night birds, as the owl, the retina contains only rods, no cones. The visual purple is associated only with the rods. With low illumination in man there is much more rapid depreciation of central than of peripheral vision, so that vision in these circumstances is chiefly carried out through the rods. The form sense, dependent upon the cones, quickly diminishes in passing from the point of fixation toward the periphery, but at night acute appreciation of variations of light and shade is much more important than accurate delineations of objects. The cones, of course, do not escape destruction in the affected zonular area, but their loss is discounted by their relatively unimportant functions in this situation.

Another form of night blindness is stationary. It is always hereditary and shows no gross changes in the fundus. It is rare except in families affected with it. No case of this form has been examined anatomically. It may possibly be found that the retina is deficient in rods or visual purple.

Another group is that of syphilitic pigmentary retinitis. It does not show the same uniformity either of symptoms

or objective signs. The night blindness is progressive during the active stage of the disease, but may then remain stationary for an indefinite period.

Besides the chronic forms of the disease showing this symptom there are also acute forms, and there is nearly always one feature common to all these—malnutrition. We meet them in poorly nourished children and a large proportion of them have xerosis of the conjunctiva. There is, however, no inherent relationship between the xerosis and the night blindness other than a common cause.

Acute night blindness was once common among soldiers, sailors and inmates of prisons, etc., and in Russia during the Lenten fast. Uhthoff found it in 5 per cent. of the cases among 500 of severe alcoholism, and less frequently it is found associated with scurvy, malaria, nephritis, the puerperium, vegetarianism. Most of these patients have photophobia. Nettleship says that if a person affected with this form of the disease covers one eye during the daytime, that eye has sufficiently good vision at night for a man to get about and attend to his work. Probably in such cases the visual purple is restored more slowly than normal.

Another group is composed of those cases associated with jaundice. In some of these, pigmentary changes of slight degree have been found in the retina, but in most the ophthalmoscopic signs are negative. Bile salts are a solvent of the visual purple. Night blindness was common in India during the period of famines, and yet those symptoms are found to disappear when the patients are fed on liver—a mode of treatment mentioned as early as the Eber Papyrus (B. C. 1500).
W. E. B.

A Warning Against the Indiscriminate Use of the Ophthalmo-Reaction.

RAMSEY, A. MAITLAND (*The Lancet*, March 7, 1908). A girl, 12 years old, was admitted to the hospital suffering from superficial vascular ulceration of the right cornea, and in the left a faint nebula, the result of a previous ulcer, but no inflammation whatever. The cervical and submaxillary glands were enlarged, but there were no signs of tubercle in the lungs or abdomen. One drop of

a 1 per cent solution of tuberculin was instilled into the left eye, and within twenty-four hours there was a violent muco-purulent reaction which could not be influenced by treatment, but progressed until the cornea became vascular and abraided over the central area. Koch's old tuberculin was injected subcutaneously with elevation of temperature and improvement in the condition of the right eye. The left eye, however, was much slower in improving, but eventually the inflammation subsided. A considerable opacity, however, remained in the center of the cornea as a result of the Calmette, and the vision was seriously impaired.

W. E. B.

The Clinical Symptoms of Epidemic Cerebro-Spinal Meningitis (the Ocular Symptoms).

DOW, WILLIAM (*The Lancet*, March 14, 1908). This somewhat extended article is based upon 183 cases of epidemic cerebro-spinal meningitis admitted into the Belvidere Fever Hospital during the recent epidemic from May, 1906, to May, 1907. Under the head of the symptoms pertaining to the organs of special sense, he states that the eye and ear have been more frequently affected. With regard to the eye the pupils in the irritative stage of the disease have been contracted when there has been delirium. In the stage of coma they have commonly been dilated. Inequality of the pupils has been very frequent in all stages of the disease. They have commonly responded very feebly to light. An irregular form of hippus has been frequently observed both in acute and in chronic cases. In this the pupils have contracted and dilated with something approaching a rhythmic frequency, the oscillations commonly occurring from 10 to 15 times a minute. A comparison between the maximum of dilatation and maximum of contraction has been greater than normal and the oscillations have been irregular in speed and in rhythm. This has occurred without the eye being illuminated or the gaze being fixed on a distant object. Strabismus has been moderately common at all stages, being apparently due to pressure rather than to central lesion of the nerve, as it varied in the same subject from day to day. In only one case which recovered was the squint permanent, and

in this case it was internal. Nystagmus, both horizontal and vertical, has been commonly observed in very acute cases and occasionally in the chronic stage.

A curious condition, consisting of an associated movement of the upper eyelids, pupils and eyeballs, has been occasionally observed in chronic cases in the stage of chronic hydrocephalus. This consisted of spasmodic retraction of the upper eyelids, accompanied with the form of hippus already described and with an irregular form of nystagmus, but not true nystagmus, where an involuntary oscillation of the eyeball occurs from side to side of the central line of vision. In these cases the nystagmus has consisted in irregular twitchings of the eyeballs in all directions and not from side to side of the middle line. Retraction of the upper eyelids has been moderately common in the stage of chronic hydrocephalus. Ptosis has not been observed. Conjunctival hemorrhages have been observed in only six cases. In acute cases there has commonly been a uniform diffuse redness of the conjunctiva. In only a very few cases has there been purulent conjunctivitis, and this in exceptional instances has proceeded to ulceration of the cornea. Out of a series of about forty cases which were examined carefully for changes in the fundus, optic neuritis has been observed in all the cases which had developed chronic hydrocephalus, but has not been found at any other stage of the disease. In the acute cases hyperemia of the optic disk has commonly been noted. A few patients have appeared to be blind throughout the course of the disease, but none of these have recovered with blindness. W. E. B.

The Bacteriological Aspects of the Problem of Neuropathic Keratitis.

DAVIES, H. MORRISTON, and HALL, GEORGE (*The British Medical Journal*, January 11, 1908). They first give a summary of the various theories of the relationship between neuropathic keratitis and the disturbances of the fifth nerve and Gasserian ganglion. (1) The Purely Trophic Hypothesis. (2) The Trophic-Traumatic Hypothesis. (a) Trophic with Central Irritation. (b) Trophic with Peripheral Irritation (other than organisms).

(3) The Vasomotor Hypothesis. (4) The Vasomotor Traumatic Hypothesis. (5) The Purely Traumatic Hypothesis. (6) The Desiccation Hypothesis. (7) The Mycotic Hypothesis. They give a summary of the criticisms and objections to the first six hypotheses, and then take up the mycotic hypothesis. Their bacteriological investigations have been based upon twenty-one clinical cases in which the Hartley-Krause operation had been performed for trigeminal neuralgia. Eleven of these developed neuropathic keratitis, and nine showed no affection of the cornea. In practically all the cases staphylococcus aureus was found, less frequently staphylococcus albus, streptococcus, pneumococcus, xerosis and proteus. But there was also one other bacillus which they found only in those eyes which showed neuropathic keratitis. They refer to this as bacillus x, which appears to belong to the group of pseudo-diphtheria bacilli, and its characteristics agree very closely with those of that form known as the pseudo-diphtheria bacillus of Loeffler. It is very difficult to distinguish from the pseudo-diphtheria organism, but the following three factors help in the differentiation. The x bacillus shows occasional granular formation, gives no naked eye growth on potato, and does not render bouillon turbid. It would seem to them from the study of those clinical cases that whatever part bacillus x plays in the initial stages of neuropathic ulceration once the process is established, the staphylococci carry on the work of destruction. Nor is there any evidence to show that at this stage the tissues of the neuropathic eye react to the destructive process of sepsis in any way different from that in which reacts an eye the nerve-supply of which is intact.

They also give the result of some experimental work upon monkeys and other animals, in all of which the Gasserian ganglion was removed by Sir Victor Horsley.

Their conclusions are as follows:

1. The Bacillus x we have found to be present in about 30 per cent. of normal people.
2. The Bacillus x was present in the conjunctival sac of all those patients who had neuropathic keratitis, and the organism could be demonstrated, together with

staphylococci, among the epithelial cells at the margin of the ulcer of the excised eye.

3. In those cases which did not develop keratitis after excision of the Gasserian ganglion no x bacillus was found.

4. We, therefore, conclude that we are justified in suspecting that the presence of the bacillus in the sac is necessary for the production of neuropathic keratitis.

5. The presence of the x bacillus, however, without an associated lesion of the Gasserian ganglion, does not lead to keratitis.

6. Mere presence of the organism in a patient whose Gasserian ganglion has been removed is not sufficient to produce neuropathic keratitis, because if the eyelids are sewn together, the disease does not develop, or, if the condition is already present, it will tend to heal rapidly after suture of the lids. We are, therefore, driven to conclude that there is a third necessary factor, and that this factor is in some way prevented from acting by closure of the lids. The result of closing of the lids may be due either to the effect on the organism or to the effect on the eye. The organism continues, however, to live in the conjunctival sac, in spite of the closure of the lids.

Now, closure of the lids must act on the eye in one of two ways: Either by affording protection to the cornea or by abolishing the recurrent friction of the lids.

Our investigations, then, lead us to suspect that for the production of neuropathic keratitis three factors must be present: (1) Removal of the Gasserian ganglion; (2) the presence of the bacillus; (3) a factor of undefined nature dependent on the eyelids and removed by closing them. (1) and (2) are not adequate alone, as suture of the lids prevents or cures neuropathic keratitis; (1) and (3) are not adequate alone, because, as we have shown, keratitis only occurs after destructive lesions of the Gasserian ganglion when the organism is present and in the same proportion of patients as that in which the organism occurs in normal persons.

The mode of action of the first factor is, of course, in no way elucidated by our investigations. W. E. B.

Note on Calmette's Ophthalmo-Reaction for Tuberculosis.

WEBER, F. PARKES (*British Medical Journal*, February 15, 1908). The writer speaks of the reaction not taking place in cases of undoubted tuberculosis and taking place in other patients who gave no evidence of tuberculosis. He reports five physicians, apparently healthy, who tried it on themselves with positive results, although in one of these a second installment was made in the other eye. In one instance one drop of the same tuberculin fluid which excited a violent reaction in a healthy man failed to produce any reaction whatever in the eye of a man with characteristic clinical signs of active tuberculosis of the upper part of one lung.

Much light is thrown on such anomalous results of the test by a recent communication of Waldstein, who has observed violent reactions as a result of the test in some cases of follicular conjunctivitis, and even in ordinary chronic catarrhal conjunctivitis, whereas the result of the test has been completely negative in some other affections of the eye, notably in tuberculosis of the iris.

J. B. Gibb in the *British Medical Journal*, February 22, 1908, page 443, states that he has proof that a reaction obtained only after a second application of the Calmette test, even though it be applied to the opposite eye, is no evidence of a tuberculous lesion. W. E. B.

Urotropine in Night Blindness.

MALLANNAH, S. (*British Medical Journal*, February 22, 1908). Defective nutrition plays an important part in the production of night blindness. He reports twelve cases — xerosis was noticed in only two of them. A peculiar muddy colored pigmentation of the conjunctiva around the inner and outer margins of the cornea was observed in eleven out of twelve cases. This pigmentation is due to the irritation of the conjunctiva with particles of dust, and it is found only in the exposed portion of the conjunctiva, never in the part covered by the lids. He believes that the torpor retinae (which expresses the whole pathology of night blindness), xerosis and conjunctivitis pigmentosa are nothing but effects of the diminished

alkalinity of the blood, and that the night blindness is easily cured by the internal administration of urotropine. He considers it specific in this complaint and states that most of his cases get well completely within a week.

W. E. B.

ABSTRACTS FROM GERMAN OPHTHALMIC
LITERATURE.

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Concerning Temporary Rises of Tension.

DUFOUR, LAUSANNAE (*Die Ophthalmologische Klinik*, July 5-20, 1907). Dufour believes that the difficulty in opening the eyelid in the morning, of which many persons complain, is due to rises of tension in the eyeballs and not, as usually held, to "conjunctivitis sicca," a term dear to German and English ophthalmologists. He thinks the increase of tension makes the eyeballs swell and causes the lids to be stretched tightly over them. The tension would also account for the blurring of vision, common in such patients which disappears most quickly if active exercise be taken on rising. The causes of increased tension are three: the darkness, rest and lack of activity, and pressure on the vessels of the neck. The darkness acts by allowing the pupil to dilate and the vessels of the iris to fill; he speaks of a patient who has rise of ten-

sion in passing through a tunnel; rest favors stagnation of the circulation in the general system and in the eyes. He, therefore, advises such patients and all subject to glaucoma to have a light burning in the sleeping room, and to use pilocarpin on retiring. After operations for glaucoma he removes the bandage as soon as possible, and allows plenty of light in the room, to prevent rise of tension in the other eye. E. A. S.

Concerning the Occurrence of Blindness in the Scandinavian Countries and Finland, at the Beginning of the Twentieth Century.

WIDMARK, J. (*Ref. in Klin. Monatsbl. f. Augenheilk.*, January, 1907), says that the decrease in the number of blind over 60 years, is due to the increased number of glaucoma operations and cataract extractions. In Sweden the number of extractions in the general hospitals had increased from 2547 between 1881-90 to 3692 in 1891-1900, while the total population increased only 7.3%. In Sweden, as in most of the European countries, there were more men blind than women, a fact which could be explained by industrial influences. In the Seraphim Hospital accidents were accountable for 20 per cent. of the cases of incurable blindness. The number of cases of blindness due to sympathetic ophthalmia is distressingly high, amounting in 1904 to not less than 18.4 per cent. among the young patients in the blind asylum. E. A. S.

Concerning Subjective Pathological Color Sensations Resulting from Intoxications.

HILBERT, R., Sensburg (*Klin. Monatsbl. f. Augenheilk.*, May-June, 1907), collected all reported cases of abnormal color sensations produced by various intoxications. From these it appears that yellow vision is most frequently produced, less frequently blue and violet vision, and then red and orange vision. A substance which causes green vision has not yet been observed. E. A. S.

Anatomical Examination of Both Eyes in a Case of Sympathetic Ophthalmia.

LENZ, Breslau (*Ref. in Klin. Monatsbl. f. Augenheilk.*, October-November, 1907, p. 468 — meeting of the German Naturalists and Physicians, September, 1907.) Lenz examined both eyes in a case of sympathetic ophthalmia. In the exciting eye he found extensive endophthalmitis in Fuchs' sense, together with the characteristic infiltration of the uveal tract, especially of the pars plana of the ciliary body. The process was already in a regressive stage, as shown by the presence of numerous polyblasts, a cell form which the speaker defines in detail. The infiltration of the sympathizing eye was very recent, and prove, according to his view as opposed to that of Fuchs', that in the early stages the infiltrating lymphocytes come from the blood, and only in the late stages does he admit that they come from the adventitial cells of Marchand. Secondly, these may break into the blood vessels.

He found, further, in the sympathizing eye that the lumen of a number of the retinal vessels was obliterated probably by embolism, while around them was only a thin mantle of round cells. Secondly there occurred also partial thrombotic closure of the veins. In this discovery, which had not been made previously, he believed he had found a substantial support for the metastatic theory of the transfer of the sympathetic inflammation from the injured to the sympathizing eye.

In the discussion, Axenfeld inquired whether the obstruction could be followed into the capillaries, as the material must be only such which could pass through the lung capillaries. Lenz replied that the emboli had not been followed into the capillaries.

E. A. S.

Warning Against the Unrestricted Use of Dionin in Glaucoma.

SENN, A. (*Wochenschr. f. Ther. u. Hyg. des Auges.*, March 7, 1907). Senn reports a case of chronic, non-inflammatory glaucoma in which the use of a 10 per cent dionin ointment on two different occasions produced an attack of acute glaucoma, with very high tension. The

same thing occurred in a patient with posterior synechiae due to severe iridocyclitis. In this case, it was used in combination with scopolamin, which had always been well borne previously. Senn believes that dionin hinders the filtration through the anterior lymph channels by pressure of the resulting oedema on the veins, and in addition causes increased secretion from the ciliary processes. It will, therefore, be dangerous in cases in which the posterior lymph channels (the perichorioidal space, and circumvascular lymph channels about the venae vorticosae, scleral vessels and central vessels of the retina) are blocked. He thinks, moreover, that dionin could be used to determine the permeability of these posterior lymph channels. He warns against giving prescriptions containing dionin to patients with glaucoma and secondary glaucoma, and advises its use very cautiously under observation of the patients in the clinics.

E. A. S.

Contribution to the Clinical Side of Glaucoma.

LEVI, EMIL, Stuttgart (*Klin. Monatsbl. f. Augenheilk.*, October-November, 1907). Levi reports a case of primary glaucoma which was complicated later by acute iridocyclitis, due to syphilitic affection. The use of eserine increased the iritis, producing synechiae, while scopolamin aggravated the glaucomatous process. Iridectomy temporarily added to the severity of the iritis, but the scopolamin was then better borne, and the iritis controlled by its use and the administration of mercury and iodide.

E. A. S.

Treatment of Chronic Glaucoma by a Combination of Iridectomy and Sclerotomy.

LAGRANGE (*Ref. in Klin. Monatsbl. f. Augenheilk.*, May-June, 1907). Before the French Ophthalmological Society, 1907, Lagrange advocated the combined use of iridectomy and sclerotomy as the only way of producing without danger a permanently filtering scar, in glaucoma, and thus keeping open the drainage system of the eye. This operation produces a subconjunctival fistula, which allows the intraocular fluids to emerge beneath the conjunctiva,

where they can be absorbed. He has obtained much better results in chronic glaucoma than by any other method. Out of twenty-three cases, twelve had improved vision, eight retained the same amount of vision. In two cases the result was not good, but he did not secure a filtering scar in them because of a fault in technique. He believes the operation an advance in our method because it secures a filtering scar, without causing incarceration of the iris and other disadvantages. E. A. S.

Concerning the Use of High Frequency Currents in Glaucoma.

TRUE, H., IMPERT, A., and MARQUES, H. (*Sem. Med.*, April 7, 1906, ref. in *Wochenschrift f. Ther. u. Hyg. des Auges.*, May 10, 1907, and *Allgemein. Wiener mediz. Zeitung*, 1907, No. 18). The authors reported a case of subacute glaucoma in a patient 17 years old, in which the process advanced despite iridectomy. High frequency currents in the form of autoconduction were used and after thirteen days the blood pressure, measured by Potain's sphygmomanometer, was reduced from 28 to 17 1-2, and the intraocular pressure was reduced on both sides. The vision improved from zero to finger counting at several meters. The authors believe the method of value in acute glaucoma, after operation and especially in chronic hemorrhagic glaucoma where the usual treatment does not stop the advance of the disease. E. A. S.

Sajodin in Ophthalmology.

FEJER, JUL., Budapest (*Gyogasz.*, No. 25, 1907; Abst. in *Wochensch. f. Ther. u. Hyg. d. Auges*, October 24, 1907, Vol. xi, p. 30). Fejer uses sajodin in large quantities in the most different diseases of the chorioid and in progressive myopia. It is odorless and pleasant to take in the tablet form. It never produces iodism. Dose 1-3 g. daily.

C. L.

Blepharitis.

UNNA, Hamburg (*Med. Klinik*, 1907; Abst. in *Wochensch. f. Ther. u. Hyg. d. Auges*, October 31, 1907, Vol. xi, p.

34). Unna advises in blepharitis ciliaris the use of a salve composed of zinc ointment combined with either one or all of the following: Resorcin, ichthyol, oxid of mercury 2-5 per cent strength. This is rubbed on the margins of the closed lids before retiring. For the conjunctivitis almost always present, the following is recommended:

R. Pyraloxini. 0.01-0.05
 Aq. Boracis.
 Aq. foenic. aa 5.0
 S. Eye drops.

C. L.

The Prevention of Blindness Due to Discharge of Pus in the Eyes of the New-Born.

HALTENHOFF (*Wochensch. f. Ther. u. Hyg. d. Auges*, November 7, 1907, Vol. xi, p. 47). The author draws the following conclusions:

1. The purulent ophthalmia of the new-born, in Switzerland as elsewhere, one of the most frequent causes of incurable blindness, belongs, as is well known, to the causes of blindness most easily prevented.

2. The ratio of ophthalmias of the new-born to the total blindness in Switzerland was, in 1895, almost 7 per cent (136 to 2107 blind). It is certain that this percentage could be materially reduced through proper prophylactic measures, and could even be brought to a minimum, as has been done in individual cantons.

3. Most of these measures, including the most important ones, are to be used both before and after delivery, and accordingly the most important task of preventing the blindness falls to the midwives. Their relation to the eyes of the child, as has been recognized in the most advanced countries, forms a most important part of the civic regulation of midwifery.

4. In the different Swiss cantons there is the greatest divergence in the methods of protecting the eyes of the new-born, ranging from complete neglect to the latest prophylactic measures of therapy and hygiene. The standardizing of these measures in all the cantons, on the basis of the most advanced methods, is absolutely necessary. As

a sample of the best regulations of midwifery are those of the cantons of Bern, Freiburg and Zürich.

5. In addition to the care before, during, and after delivery, the use of the best and only sure prophylaxis against infection of the eye, Crede's method, should be made obligatory. This can easily be learned in midwifery, and should employ a 1 per cent silver nitrate solution, or some other remedy found by the health commissioners to be equally good.

6. In order to prevent subsequent infection of the eye, the midwife, nurse and mother must follow the instructions given them.

7. It is desirable to furnish parents in all the cantons with distinct instructions and warnings as to the danger of blindness for the new-born and the danger of others becoming infected. This would be best accomplished by the civil officers at the time of reporting births.

8. All midwifery instructions as to the protection of the eye of the new-born against infection should be prepared by a commission of physicians and should be distributed by the confederated health officers, accompanied by a statement from the Central Society for Blindness of the Cantons of the importance and urgency of the subject.

C. L.

Discussion of Metastatic Ophthalmia in the Puerperium.

FEIERTAG, J., Bobruisk (*Excerpta medica*, xvii; Abst. in *Wochensch. f. Ther. u. Hyg. d. Auges.*, November 14, 1907, Vol xi, p. 50). Feiertag reports the case of a woman who, three days after childbirth, developed a high fever that lasted two weeks, due to uterine infection. One week later, in spite of the general improvement, the patient experienced a severe pain in the right eye, though examination showed only a slight infection of the conjunctiva bulbi. The next day, however, there was severe pain, great edema of both lids, chemosis of the conjunctiva and slight exophthalmus. This had increased by the next day and it was necessary to separate the lids with the fingers in order to see the cornea. The next day a retractor was necessary. The cornea was unaffected, except that it was anesthetic; the pupil was irregular, immobile and through it

could be seen a diffuse greyish cloudiness of the vitreous. The diagnosis of a metastatic abscess of the vitreous was made. The pain lasted nearly two weeks, but the temperature remained normal. At this time, a small scleral fistula was found to the left, upwards and inwards, and this was enlarged in order to permit freer escape of the pus. A couple of weeks later, another incision was made close to the other by an oculist. Gradually the condition of the eye improved, but the pupil remained irregular and the cornea anesthetic. The vitreous retained its greyish color.

C. L.

Apoplexy Following Iridectomy.

WESTERMANN, H., Riga (*Excerpta medica.*, xvii; Abst. in *Wochensch. f. Ther. u. Hyg. d. Auges.*, November 14, 1907, Vol. xi, p. 52). Westermann makes the following communication: A patient with a perforating wound of the right cornea was iridectomied and an unsuccessful attempt was made to remove the foreign body with a Hirschberg's magnet, without narcosis. The next day there suddenly appeared signs of left-sided hemiplegia. The eye later had to be removed on account of the other eye. The hemiplegia improved until the patient was finally able to work. The author claims that the apoplexy was due to the ocular condition.

C. L.

Eucerin, a New Base for Salves, Prepared from Wool-Fat.

UNNA (*Med. Klinik*, 42-43, 1907; Abst. in *Wochensch. f. Ther. u. Hyg. d. Auges.*, November 21, 1907, Vol. xi, p. 57). Eucerin is prepared by isolating the oxysterin group from wool-fat. Five parts of this are mixed with ninety-five parts of unguentum paraffini. This is called eucerinum anhydricum, and mixed with equal parts of water gives eucerin. It is stable, soft, pliable, miscible when cold with drugs, salves and paste in any proportion, absolutely odorless and capable of taking up liquid drugs in large quantities. Hydrarg. oxyd. flav. 0.3 to eucerin anhydr. 10.0 gives a fine salve for conjunctival inoculation.

C. L.

The Relation Between Autointoxication and Ocular Disease.

WIRTZ (*Medizin. Klinik*, 43, 1907; Abst. in *Wochensch. f. Ther. u. Hyg. d. Auges.*, November 21, 1907, Vol. xi, p. 58). Wirtz reports two cases. One a condition resembling herpes zoster, wherein two etiologic factors entered. First, there had been an erysipelatous attack fourteen days before. Second, there were the general symptoms, severe intestinal disorder and large amount of indican in the urine, all pointing to autointoxication. The erysipelas had left the trigeminus, probably, as a locus minoris resistentiae, causing this nerve to be involved. Isolated trigeminus paralysis is rare, and is usually due to a tumor at the base of the brain, or to trauma. It may be due to rheumatism, poisons and toxins, or to causes whose nature is not yet known. The treatment consisted in a thorough evacuation of the bowels, which was followed by an immediate amelioration of the condition.

The second case was a retrobulbar neuritis, without history of misuse of tobacco or alcohol, organic nerve affection or nasal sinus disease. Regulation of diet, and exhibition of calomel and guaiacol formed the treatment.

C. L.

Purulent Inflammation of the Middle Ear and Its Complications.

HEINE, Königsberg (*Zeitsch. f. ärzt. Fortbildung*, 18, 1907; Abst. in *Wochensch. f. Ther. u. Hyg. d. Auges.*, November 21, 1907, Vol. xi, p. 60). Heine says nystagmus is caused by an irritation of the vestibular apparatus due to involvement of the labyrinth in the purulent inflammation. In acute conditions, nystagmus may be caused by pus in the middle ear, but this disappears upon paracentesis. Barany has observed that injection of cold water into the normal ear will produce rotary nystagmus towards the opposite side, while hot water will cause it towards the same side. Absence of these reactions shows that the vestibule no longer functionates, and thus gives indication for opening the labyrinth.

C. L.

Contribution to the Question of the Traumatic Origin of Chorioidal Sarcoma.

HARTMANN (*Excerpta medica*, xvii, No. 2; Abst. in *Wochensch. f. Ther. u. Hyg. d. Auges.*, November 21, 1907, Vol. xi, p. 62). Hartman describes the case of a 59-year-old mountaineer, who came to Eversbusch's clinic July 1, 1905, with the history of progressive loss of vision in the right eye for four weeks. He regarded it as due to a blow on the eye 6-7 weeks before. Ophthalmoscopically, there was a detachment of the retina, due either to a neoplasm or hemorrhage. After several weeks the vision was nil, and November 20, 1905, the eye was enucleated on account of severe glaucomatous symptoms. Microscopically, a round-cell chorioidal sarcoma was found.

The question is whether the trauma caused the neoplasm, or whether the latter was already present and was awakened into new activity by the blow. Similar cases are reported from the literature. C. L.

Traumatic Neuroses.

SCHULTZE, F., Bonn (*Zeitsch. f. ärztl. Fortbildg.*, No. 20; Abst. in *Wochensch. f. Ther. u. Hyg. d. Auges.*, November 21, 1907, Vol. xi, p. 62). To determine whether trustworthy answers have been made, the sense organs, especially the eyes were examined. For a time, special weight was laid on the field of vision, and if this was concentrically contracted, it was regarded as characteristic of hysteria. If the contraction for near was coupled with similar conditions for distance, many examiners believed, and believe even yet, that it was a case of simulation. Others do not agree with this opinion. It is simple to let a skillful oculist make the several tests whereby simulation can be shown. C. L.

A Case of Dacryocystitis Healed by Intercurrent Erysipelas.

OSOLIN, J., Dorpat (*Centralblatt f. prakt. Augenheilk.*, December, 1907, Vol. xxxi, p. 353). Osolin reports the following case: The patient had always suffered from epiphora. Three months before, the region of the left

lacrimal sac commenced to swell, without external cause, and resulted in fistula which discharged pus. No result was obtained from probing or syringing with protargol. Accordingly, the lacrimal sac was extirpated and its former place as well as the ductus nasolacrimalis was curetted until the patient felt a pain in the nose. The fistula was also opened and curetted, and then sutured. The healing progressed favorably, but on the day the patient was to be discharged, he had a chill, headache and malaise. This was the forerunner of a characteristic facial erysipelas. From the upper end of the vertical scar, a yellowish fluid was discharged which contained streptococci in large quantities. The erysipelas passed away without untoward results, except that the fistula took a long time to heal. It was noticed, moreover, that the discharge from the right lacrimal sac had ceased, and probing showed that there was no stricture. The erysipelas seemed to have effected a cure. C. L.

The Use of Fibrolysin in Ophthalmology.

BRANDENBURG, G., Trier (*Med. Klinik*, 1907, No. 30; Abst. in *Wochensch. f. u. Hyg. d. Auges.*, November 28, Vol. xi, p. 65). Fibrolysin, a combination of thiosinamin with sodium salicylate, has produced good results in cicatricial conditions and fibroid tumors. Accordingly, the author has used it in similar ocular conditions without untoward local symptoms, but also without much benefit.

C. L.

The Statistics of the Inheritance of Ocular Diseases.

KAUFFMANN, F., Ulm (*Wochensch. f. Ther. u. Hyg. d. Auges*, November 28, 1907, Vol. xi, p. 68). Kauffmann refers to the recent circular letter from the Scotoic Aid Society of Missouri as an attempt to collect international statistics on heredity in ocular diseases. Whether or not it will be completely successful, it will furnish a collection of facts from which certain conclusions may be drawn. The circular first requests an opinion on the advisability of allowing the blind to marry each other or person with normal sight, with the reason for the answer given. It

then requests as complete a list as possible of cases of hereditary blindness, the cause of each, number of patients in each family and their relationship to each other. He refers to the difficulties in the path of the investigator, arising from different nomenclature, unreliability of histories, the question of the inheritance of the disease itself or simply a predisposition, etc. Still, by a careful filling out of the blank furnished, much valuable information can be secured. He quotes a case of glaucoma which could be followed through four generations with six persons involved.

C. L.

The Relation of the Ophthalmo-Reaction of the Tuberculin Test to Tuberculosis and Trachoma.

SCHIELE, A. (*Wochensch. f. Ther. u. Hyg. d. Auges.*, December 5, 1907, Vol. xi, p. 73), discusses this at length. He reviews the method of performing the test. In performing it in distinct cases of trachoma, he found that even in the first twenty-four hours following the instillation, the follicles became turgescient and this was accompanied by a more or less severe catarrhal condition of the conjunctiva. On the following days, the symptoms are intensified and new follicles appear, even on the conjunctiva bulbi. The picture is one of an acute or subacute trachoma. No such reaction takes place in chalazia, hordeola, pterygia, keratitis parenchymatosa luetica, etc. Follicular catarrh, on the other hand, reacts like trachoma, proving the identity of the conditions. Cases of trachoma treated or cured by means of the hydriodic acid-stick do not react to the tuberculin tests, although they were made repeatedly at long intervals. It would seem that there is a relationship between trachoma and tuberculosis, just as the pathologic pictures of the two have much in common. In testing cases of previous phlyctenular affections of the eye, the result was invariably the production of an acute phlyctenulosis. The author gives a table of sixty-eight patients tested by the ophthalmo-reaction and found that it was positive in nine out of eleven cases of conjunctivitis follicularis and in eighteen out of twenty-seven cases of trachoma. Seven of the negative cases of the latter had been treated with hydriodic acid. In all cases of

healthy individuals with healthy eyes, the result was always negative.

His conclusions are that the ophthalmo-reaction occurs in scrophula (tuberculosis) and in follicular catarrh and trachoma. Accordingly, the latter conditions must be excluded before the former can be diagnosed.

The test must not be used in the advanced stages of trachoma since undesirable exacerbations are evoked. The positive ophthalmo-reaction in a case of conjunctivitis proves its trachomatous nature.

Since all cases of trachoma treated with hydriodic acid react negatively, this remedy is undoubtedly the best. Conjunctivitis eczematosa can be exacerbated by the test into an affection of the entire conjunctiva. C. L.

Modern Methods of Illumination and Their Hygienic Importance.

ERISMAN (*Wochenschr. f. Ther. u. Hyg. d. Auges.*, December 5, 1907, Vol. xi, p. 79).—The author draws the following conclusions:

(1) In the artificial illumination of certain inner rooms, the production of the largest possible amount of light is coupled with the important factor of its correct distribution and the obviating of disturbing shadows, and of the dazzling of the illuminating body. Since an even distribution of light cannot be accomplished by direct illumination, nor can the dazzling effect be prevented, and since the half-shadows formed in illuminating rooms, even otherwise well illuminated ones, interfere so much and the difference in the lighting of the shadowed and unshadowed places is so great that the general illumination, however great it may be, is distinctly lessened (further increase of the light having no influence), the desired object can best be obtained by indirect (diffuse) lighting. The question of whether, or how much, the direct high illumination will correct the faults of the ordinary direct lighting seems so far not sufficiently clear.

(2) The advantages of the indirect method consist in the absence of the light and the absence of shadows and dazzling. Everywhere in the room writing is easy, as is all work.

(3) For rooms where finer handwork or drawing are to be done, a brightness of at least 50 meter-candles is necessary; where only reading and writing are done, a minimum of 25-30 is necessary. The usual school room belongs to the latter category.

(4) Indirect illumination is to be recommended for industrial establishments, except such where fine work and small objects are to be shown.

(5) When the amounts of light are the same, the effect of the illumination depends (a) on the number of lights and their arrangement, the distribution being more perfect the more the lights are scattered around the entire working surface; (b) on the distance of the lights from the ceiling, being better the closer they are to the ceiling; (c) on the color of the ceiling and the walls, being better when they are whitewashed; (d) on the form of the reflectors and their surface. The reflector must be closer so that it is struck by all horizontal rays and must possess a large angle of opening. Globes with brilliant surfaces give the best results; (e) on the height of the room to be illuminated, 3.5 m. at least being required.

(6) The half indirect method where translucent globes are placed below the lights are better than the direct, but not as good as the indirect.

(7) In indirect illumination, any sort of illuminant can be used, the one to be chosen depending on circumstances. As a rule, the electric arc light is the best.

C. L.

Contribution to the Removal of Fragments of Iron from the Eye with the "Innerpole-Magnet."

AMBERG, Basel (*Zeitschrift f. Augenheilkunde*, Vol. xviii. No. 16, Dec. 1907), reports 16 cases in which iron particles weighing .00005 to 0.7922 grams were removed from the eyeball by means of the inner-pole-magnet, in use at the Basel University Eye Clinic. The largest piece removed was 14 mm. long, 9 mm. broad, and 2.4 mm. thick.

The after treatment is very important. Eyes that are infected can often be saved by the use of subconjunctival salt injections, the inunctions of mercury and the internal administrations of iodide of potassium.

The visual result of thirteen cases of perforation by foreign body operated upon with this magnet was as follows:

Two cases showed 2/3 to full vision.

One case showed 2/7 vision.

Seven cases showed 7/200 to 2/1000 vision.

On account of traumatic cataract, two cases of phthisis bulbi and one case of retained globe with no vision.

F. K.

The Role of So-Called Neuroses, Especially the Psychoneuroses, Hysteria and Neurasthenia in Ophthalmology.

BARTELS, Strassburg (*Zeitschrift f. Augenheilkunde*, Vol. xviii, No. 5, November, 1907). Bartels reports that the term neurosis includes, as ordinarily intended, nervous diseases in which no distinct anatomical lesions have as yet been found either microscopically or macroscopically—in contradiction to organic nervous diseases. This broad conception, therefore, embraces migraine, epilepsy, tetany, paralysis agitans, chorea, etc., as well as the various phases of hysteria and neurasthenia.

The psychical element is, however, wanting in the former group, while it is pronounced in the second group which should be termed *psychoneuroses*.

..He believes that it is impossible to cure any one of the diseases of the former group, as, for instance, epilepsy, by the correction of astigmatism by glasses. Those cases apparently cured in this way were undoubtedly suffering from psychic nervous weakness or even hysteria. Experience shows that psychic influences in hysteria rarely cause peripheral organic changes. In the eye, nothing is known of such changes. When they are present, the diagnosis of hysteria is faulty. The differential diagnosis is in many cases extremely difficult. The psychic symptoms of hysteria and neurasthenia may be the preliminary symptoms of an organic disease.

The author relates the case of a woman 30 years old, whose vision in the right eye was reduced to 1/6; left eye, V = 6/6. The eyeground was normal. R. Field showed a central scotoma. The diagnosis was beginning retro-bulbar neuritis.

The patient's general nervous symptoms varied so much from day to day that a diagnosis of hysteria seemed probable and was made. Eventually, however, it became evident that she was one of those rare cases of multiple sclerosis, beginning with vague, apparently psychoneurotic symptoms, but later developing after acute illness into the chronic stages of the organic disease.

Among the subjective complaints of the psychic nervous patients are symptoms exactly simulating those of chronic conjunctivitis; the objective signs are absent and the symptoms exaggerated by the patient. It must not be forgotten that similar pains can be caused by affections in the neighborhood of the eye in nervous individuals. The author found a trigeminal neuralgia, neuralgia of the occipital nerve and neuralgia of the brachial plexus, causing ocular pains which disappeared upon the treatment of these lesions.

Alterations of vision and of color perception are common. Spasm of the orbicularis and external muscles of the eye, and palsies of the same, are met with. The author recites cases exhibiting ptosis pseudo-paralytica, due to hysteria and cured by suggestion, and one due to multiple sclerosis in which hysteria was diagnosed at first, because the symptoms disappeared by suggestion.

Disturbances of the inner muscles of the eye are also described by Bartels. He cites cases of conjugate deviation and of nystagmus, cramp of convergence, asthenopia nervosa, or insufficiency of convergence, due not to local lesions but to psychic disturbance.

Pseudo-myopia, due to cramp of the ciliary muscle, is often caused by the psychic nervous state. The cure is to be obtained in all such cases by drawing the attention of the patient from his eye, withdrawing local treatment and treating the psychic condition. F. K.

Hereditary Transmission of Strabismus.

SICHERER, V. (*Muench. med. Wochenschr.*, June 18, 1907), cites an interesting example. Both father and grandfather had a left-sided strabismus. One son from the father's first marriage and three sons from the second marriage,

developed squint. The convergent strabismus in each case was left-sided, the eyes being hyperopic and amblyopic. The daughters' eyes were emmetropic and without deviation.

Two brothers and two sisters of the father had a squint, this affection being likewise transmitted to a son of one of the brothers, an only daughter of one sister and two grandsons of one of the sisters. A. C. S.

A Contribution to the Knowledge of Visual Disturbances and Blindness of Nasal Origin.

MAYER, O. (*Wiener klin. Wochenschr.*, August 1, 1907, No. 31), reports a case of sudden complete, right-sided blindness in a woman 76 years old, the loss of vision occurring during an attack of rhinitis. During the following three weeks vision in O. S. gradually fell to 3/10. There was no central scotoma. In O. D. there was slight paling of the disc and several small retinal hemorrhages; in O. S. no abnormal changes were noted. Rhinological examination disclosed a right-sided chronic empyema of the accessory sinuses. The antrum, sphenoidal and posterior ethmoidal sinuses of the right side were opened and drained. This was followed by rapid increase of vision in the left eye, the right eye remaining blind.

He divides the sinuses, ophthalmologically considered, into two groups: 1. Those which surround the orbit (frontal, antrum and ethmoidal). 2. Those which are closely associated with the optic canal (sphenoidal and posterior ethmoidal).

Affections of the first group are apt to cause orbital complications (orbital phlegmon), of the second retrobulbar neuritic manifestations characterized sometimes as in the above cited cases by retinal ischemia and pale nerve heads indicative of compression of the central vessels.

After referring to Halstead's, Hepburn's, Snow's and Onodi's views on crossed amaurosis, he interprets the genesis of the visual disturbances as follows: The acute rhinitis caused an acute swelling of the nasal mucosa leading to retention of purulent exudate in the sphenoidal

sinus, thereby increasing the inflammatory reaction. The infection may then have been conveyed to the right optic nerve through the venous system or through possible defects in the wall of the sinus, thus directly involving the sheath of the nerve with the production of venous stasis, edematous infiltration or compression of the nerve trunk.

Impairment of vision on the opposite side could have been induced by progression of the inflammatory process affecting the right nerve backward to the left optic nerve.

A. C. S.

A New Curative Animal Serum in Human Microbic Infection.

DEUTSCHMANN (*Muench. med. Wochenschr.*, May 7, 1907, No. 19). The author found that animals inoculated with progressively increasing doses of yeast, yielded a serum effectual in the treatment of pneumonia and certain staphylococcic and streptococcic infections. Brilliant results were obtained in the treatment of acute and chronic inflammatory ocular affections (hypopyon keratitis, relapsing iritis, purulent iridocyclitis, ocular injuries). As a prophylactic he strongly recommends it before operations and after ocular injuries. The serum is manufactured in Ruete-Enoch's laboratory, Hamburg.

A. C. S.

Concerning the Treatment of Retinal Detachment.

BONRE (*Die ophthal. Klink.*, April 20, 1907, No. 8), discusses various methods of treatment, chiefly French; their multiplicity he regards as a sign of individual ineffectualness. Subconjunctival injections of concentrated salt solution, however, he considers the best therapeutic measure. The purpose of such solutions is to attract the subretinal fluid, perhaps not by a true osmosis, the chorioid and sclera hardly resembling an inanimate separating membrane, but rather by surcharging the scleral and chorioidal vessels with salt, thus favoring absorption of the fluid from the subretinal space, at the same time lessening the predisposition to serum secretion from the vessels (Jocqs). The fluid cycle which Raehlmann be-

lieves instrumental in the causation of the retinal detachment is thereby reversed.

The writer's method of treatment includes:

I. Subconjunctival injections of I. C. C. of a 30 per cent salt solution. The injections are repeated at intervals of several days, until the original visual acuity has been attained, or until there is no evidence of a possible further increase of vision.

II. Recumbent posture during the whole course of treatment; and until cicatrization of the punctiform scleral cauterization.

III. Punctiform scleral cauterization over the entire affected area.

IV. Treatment of the cause (myopia, syphilis, rheumatism, etc.): Treatment should be begun early; before degeneration of the retina has occurred.

In conclusion, he reports a cure by the treatment as outlined above. The detachment was complicated with a myopia of 10 D, comprised the whole lower and temporal portions and was of three weeks' duration. Within two weeks after commencing treatment patient read fine print.

A. C. S.

Von Gudden's Commissure.

BERNHEIMER (*Archiv f. Ophthalmologie*, Vol. lxxvii, part 1). In an earlier number of v. Graefe's Archives, Bernheimer reported the results of his examination of the brain of white rats with unilateral anophthalmus and complete absence of the corresponding nerve, which made it possible to trace the course of the uncrossed fibres to their terminal nuclei. In the breeding of these rats, several instances of bilateral anophthalmus occurred, in which the eyes were only cystoid bodies without differentiation of the retina and in which the entire optic tracts were absent.

This material is of greater value than that obtained by the degenerative method, or that following atrophy, because in it the neighboring tissue is absolutely isolated. von Gudden enucleated the eyes of new-born rabbits and showed that his commissure, although closely attached to

the chiasm, had nothing to do with the visual fibres. It is generally accepted that the greater part of these fibres end in the internal geniculate bodies.

In the rats with bilateral anophthalmus, the external geniculate bodies are much smaller than normally, as was shown in these Archives by Bernheimer, who stated that $\frac{2}{3}$ of the visual fibres entered them and from them sprung the greater part of the optic radiations.

The external geniculate bodies are, then, the chief end nucleus for the visual fibres and correspondingly the internal geniculate bodies are shown by these experiments, to be unaffected by the atrophy or absence of the visual tracts, and by serial sections the greater part of the fibres of v. Gudden's commissure may be traced to these latter structures; about $\frac{1}{3}$ of the fibres enter the optic thalamus, where they appear to end; a very few bundles of fibres reach the corpora quadrigemina. It seems certain then that the internal geniculate bodies are joined in both directions by Gudden's commissure.

The cochlear nerve is in connection with these bodies (v. Kölliker), so it is possible that v. Gudden's fibres form a sort of an auditory commissure.

This suggestion is supported by their striking development in the mouse, the rat and especially in the mole.

C. W. C.

A Case of Hemorrhagic Adenitis with Symmetrical Lymphomata of the Conjunctiva.

GOLDZIEHER (*Archiv für Ophthalmologie*, Vol. lxvii, part 1). This case differs in many respects from those which have been described, and in spite of many points of similarity it cannot be classed with the cases of lymphomata which have been associated with leukemia or pseudo-leukemia, but appears to belong to an unfamiliar disease. The disease lasted at least two years before the patient, a robust man of 45, came under observation. There was no history of any previous infection, but there had been an iritis, leaving posterior synechiae.

The skin of the face was cyanotic, with numerous tortu-

ous veins. The lids were half closed with stretched skin, distended by the tumors along the upper and lower margins of the orbit.

The upper and lower fornices in the right eye and the lower in the left eye were each filled with a dark red mass, over which the conjunctiva was stretched intensely congested but without papillary or follicular change.

The pre- and retro-auricular lymph glands were swollen; parotids and lachrymal glands normal. The axillary glands were not enlarged, but one inguinal gland was the size of a goose egg, hard and movable. Spleen and liver not enlarged.

Examination of the blood showed only a moderate anemia. Sections of tumors from the fornix and from the groin showed numerous small hemorrhages in the parenchyma, which latter consisted of small round monocular leucocytes, with few lymphocytes. Here and there were groups of epithelioid cells which took the stain faintly and were surrounded by the parenchyma cells as though by a capsule. A very few typical giant cells were found, free in the parenchyma and having no apparent connection with the groups of epithelioid cells. In the subconjunctival masses, no giant cells were found and the epithelioid cells were not grouped as in the inguinal gland. The vessels were filled and there were many hemorrhages.

No tubercle bacilli were found.

The points of similarity and of difference between this case and tubercle as well as the usual forms of lymphomata are obvious. The treatment with arsenic seemed to have little effect and the later history was unknown, except that six months later the patient's general condition seemed good and he was able to pursue his trade as a driver.

The author draws attention to the similarity in the histological appearances to that of the glands in the bubonic pest. The hemorrhagic nature of the adenitis differentiates this case from others such as the cases of Mikulicz' disease and gives it its especial value.

C. W. C.

The Permanent Drainage of the Tear Passages.

KOSTER, W. (*Archiv für Ophthalmologie*, Vol. lxvii, part 1). Many ophthalmologists are satisfied with extirpation of the sac, but it cannot be denied that all efforts must be made to find a method truly curative, which will restore the normal passages. The author describes the chronic conditions which lead to extirpation and the familiar and for the most part futile methods which preceded that operation.

To avoid the radical step and to establish permanent drainage, he passes a silk thread through the canal and leaves it in place, tying the ends on the cheek. This may be drawn back and forth and various medicaments may be rubbed on it and brought in direct contact with the wall. Because of the various endings of the lachrymal duct in the nose and its inaccessibility beneath the inferior turbinal, it is often necessary to assign this part of the procedure to the rhinologist, and the author suggests that it may be wise for him to practice probing the duct from above, so that one specialist may be master of the situation.

The instruments used are the usual sounds of medium size, and a Wecker's canula with stylet. The canulae vary in size and especially in the opening, which is either at the end or on concave side near the point, or slightly above it; this variation is intended to adapt the canulae to the differing situation of the opening into the nose through which a fine copper wire is to be passed; or the thread may be carried down through the canula by means of a fine stylet with a split end, and caught by a blunt hook in the nose.

The possible variations of the method are numerous and the author shows great ingenuity in trying many expedients which failed to accomplish the result, but in view of the individual differences in the passages and in the nose, one must be prepared to adapt means to ends. The simplest and the one most successful was with fine copper wire which was passed doubled through the canula to the inferior meatus; here it often entered the nose directed

backwards towards the pharynx, but could be caught by the blunt hook. Then the silk thread is fastened to the loop of wire and drawn up with it, through the sac, as the canula is removed.

In some cases, the introduction of the wire and its forward direction in the nose is aided by the use of a canula with the opening 0.75 cm. from the end, and on the concave side of the sound. As the opening of the lachrymal duct is about 1 cm. above the floor of the nose in the lateral wall, the opening in the canula is then free in the nose when its end rests on the floor. The end below the opening is solid, with the lower margin of the opening bevelled upwards, so that the wire is led towards the nasolachrymal opening.

The instruments devised by Koster are depicted and the steps of the procedure are described with considerable detail. The records of eighteen cases are given, most of them chronic intractable dacryocystitis, which had been treated with the usual methods for long periods, and the success of the new method is certainly most encouraging.

The duration of the treatment averages four weeks; when there is necrosis, the thread should remain two or three months; it causes no irritation when the eye is kept clean with 3 per cent solution of potassium chlorate and the secretion diminishes from the first. The thread must be cleaned daily and the patient learns to draw it back and forth and to remove the secretion. The silver stick may be rubbed on the thread, which is then drawn through the sac, or other applications may be made in solution.

The appearance of the thread does not seem to have prejudiced the patients, especially as chronic dacryocystitis occurs for the most part in patients who would be indifferent to this consideration.

There follows an admirable grouping of the chronic inflammations and obstructions of the tear passages in eight classes, all of which are amenable, in the author's experience, to this mode of treatment.

C. W. C.

The Pathology of Keratoconus.

SALZMANN (*Archiv für Ophthalmologie*, Vol. lxxii, part 1.) In this case the ectasia was limited to the middle

part of the cornea and extended a little beyond the optical zone. In this zone the cornea diminished gradually in thickness until at the apex of the conus it was less than one-quarter the normal thickness, thinner than is usual ($1/3$). The marginal part was not really ectatic, but in general showed a conical adaptation or transition.

In connection with the limitation of the ectasia to the optical zone, is the formation of a shallow groove at its margin, as was apparent in this first specimen. In another type the thinning progresses regularly from the margin to the apex of the conus with a hyperboloid curve. The difference between the two types is still more marked on the inner surface of the cornea.

The second type has been compared to the usual form of staphyloma posticum of Scarpa and the first type to that form improperly called staphyloma posticum verum. The priority in differentiating these two types belongs to Robert Sattler. The distinction between the two is not always sharp, however.

As in all cases when the ball of the bulbus is thinned, it is to be determined whether there is a simple ectasia or stretching or whether there is an actual defect of tissue preceding the conus or accompanying it in its development. On these points the author does not offer positive conclusions.

Bowman's membrane is not thinned at the apex of the conus in the present case, but shows interruptions of continuity in places, which are repaired by a fibrillary layer which is like a cicatricial tissue formed without the presence of vessels. Clinically, the tissue is seen in the faint mottling striped or branching opacities which develop, especially at the apex in high grades of keratoconus.

Descemet's membrane showed in this case a rupture which is not artifact, because the endothelial cells have proliferated at its margin. The gap was not closed by newly formed tissue as would be the case if the rupture were very old and there were no signs of imbibition opacity in the cornea which would have been the case if recent, disappearing in a few weeks.

This rupture of Descemet's membrane and the changes

in the anterior layers of the cornea seemed to have nothing to do with the etiology of the keratoconus.

The author discussed Elsching's theory, also, that a chronic disease of Descemet's membrane is a cause. Although the epithelial cells showed a peculiar granulation not obtainable in a variety of control preparations, this granulation was present in other protoplasmic tissue: lens, ciliary body, etc.

This eye showed a number of variations from the normal. In the optic nerve a neuritic atrophy which coincided with the history of idiocy and epilepsy; cataract of long standing, secondary to changes in retina and vitreous. Other interesting anomalies of a congenital nature are described, which, however, have no connection with the keratoconus, except that they indicate a faulty developmental tendency, which, after the exclusion of many other etiological factors, is the only conclusion reached regarding the cause of keratoconus.

In common with posterior staphyloma, it is not present at birth, but develops in childhood or at puberty. Both depend on a congenital tendency; have the character of an ectasia and have a similar course. Each occurs at a pole of the eye and leads to similar disturbance of function.

It is characteristic of both that they occur without previous inflammation or tension in eyes with hitherto normal form and function. They may be classed in contradistinction to other forms, as genuine polar ectasiae.

C. W. C.

The Clinical Picture of Phakoceles.

KRAMER (*Archiv für Ophthalmologie*, Vol. lxxii, part 1). This condition was described and named by Birnbacher in 1884 and since then very little has appeared in the literature concerning it. The author believes, however, that in more cases of prolapse of the iris than are suspected, the lens would be found incarcerated in the perforation. Three cases are described; all in young people, with a central perforation of the cornea; two following blenorrhoea, and one after the use of Hippel's trepan for ectatic scar. With the rise of tension a hernia-

like protrusion of the lens took place in its capsule. In advanced age, when the lens is sclerosed and inelastic, a true phakocoele is impossible, although the lens substance after rupture of the capsule may choke the wound.

The author reports a case of phakocoele following trauma which seems to be rare; a woman, aged 61, "fell on her eye." Through compression, a small rupture at the sclerocorneal margin took place, similar to those recently described by Fuchs. The wound was in the limbus, 5 mm. long, in the vertical meridian. The lens was dislocated and partially prolapsed, but the large nucleus prevented its escape; then tension rose and the soft cortical matter was pressed forward, causing the capsule to bulge outward, but the wound still compressed the nucleus, which was removed by operation with iridectomy.

This case is contrasted with those previously described in young people with soft lenses and central perforation, in which the hernia takes place with intact zonula.

C. W. C.

Cyclodialysis and Its Influence on the Intraocular Pressure.

MELLER, J. (*Archiv. f. Ophthalmologie*, Vol. lxxvii, part 3.) This operation was described by Heine about two years ago. It is much too soon to express an opinion as to its value, but if the claims of its adherents are borne out by later observation, it will prove to be an important addition to the measures for the relief of certain forms and stages of glaucoma. A somewhat extended abstract of this interesting article, which should be read, is, therefore, in order.

Under cocaine, the conjunctiva is incised about 5 mm. from the limbus, in the outer and lower quadrant. The sclera is then carefully incised, the wound being parallel to the limbus and not more than 2 mm. in length. As the site is in the ciliary region, the sclera should be cut gradually without pressure and without using the point until by the absence of all scleral resistance, the appearance of the black uveal pigment and the tenderness to slight pressure, it is seen that the sclera is penetrated. Adrenalin should be used, as hemorrhage renders the operation more

difficult, and the site chosen should avoid the anterior ciliary vessels. If a vessel bleeds freely it is best to touch it with a fine-pointed cautery. The author emphasizes the vascularity of the tissues and the varying thickness of the sclera. A wound 2 mm. in length admits easily an ordinary iris spatula and is not large enough to permit prolapse of the uvea.

The second step is the introduction of the spatula, which should pass without resistance parallel to the sclera along its inner surface, forward until its point appears in the anterior chamber.

Third stage: Separation of the ciliary body; the actual cyclodialysis. By gentle lateral movements, with the entrance wound as an axis, without pressure on the ciliary body; i. e., keeping the spatula in contact with the sclera, the ciliary body is detached and the angle is opened through the entire quadrant. The spatula is then withdrawn and the conjunctiva sutured. A protective bandage with mask is applied for three days. It is not necessary to keep the patient in bed. Myotics do not seem to be used after the operation.

Resistance in passing the spatula depends on sclera fibres which have not been entirely divided, or on ciliary vessels or nerves. Hemorrhage from an anterior ciliary vessel by which the anterior chamber may be filled with blood is a rare complication in the author's experience, but apparently cannot always be avoided; a pressure bandage is the only means of controlling it. Bleeding from the ciliary body itself is due to faulty technique in making the incision or in holding the spatula. The pressure bandage should remain eight hours. Contact with ciliary nerves may cause severe pain, but does not affect the result of the operation. Many patients have very little pain, others suffer severely because of pressure on ciliary nerves or because of careless pressure on the ciliary body.

In some cases a noticeable resistance is felt just before the appearance of the spatula in the anterior chamber. This is due to a well developed scleral spur in which the spatula catches instead of passing along its inner surface after penetrating the muscle fibres in the angle of the cham-

ber. A slight turn of the end of the spatula towards the iris enables it to pass this obstruction. Resistance may also be caused by forcing the end of the spatula between Descemet's membrane and the corneal tissue, instead of through the ligamentum pectinatum. This is easily avoided by a similar change in direction. This is sometimes manifest later by a bright line seen by focal illumination at the angle of the chamber and a triangular opacity of the cornea at the limbus. This disappears in time without complication, probably through the covering of the parenchyma exposed by new endothelial cells. It is probably one of the most frequent complications, but seems to have no clinical significance. To avoid it, it is well to have the end of the spatula not too blunt, so that it may pass through the ligamentum pectinatum, easily, without pushing the fibers before it and so detaching Descemet's membrane which passes into the ligament. At times, the black surface of the detached surface of the ciliary body seen through the cornea simulates an iridodialysis, but the latter occurs rarely and has no ill effects.

Regarding the danger of intraocular hemorrhage from opening Schlemm's canal, opinions vary. Axenfeld raised this question at Heidelberg, and Fuchs expressed the opinion that the canal was protected by the scleral spur, along the posterior side of which the spatula glides into the anterior chamber. The author states that hemorrhage from Schlemm's canal does sometimes occur, since the inner wall of the canal is formed by the ligamentum pectinatum, the fibers of which are divided by the spatula.

It is recognized that the closure of the angle is the chief factor in the causation of glaucoma, and a number of operations have been devised to overcome this condition. It has been asserted that the formation of scar has made matters worse than before the operation in many instances. Heine claims for his operation that the tendency to scar formation and contraction is as slight as after iridodialysis and that the result is as permanent. Meller does not take this wholly optimistic view, and states that in the eyes of animals the opposite has been demonstrated and that a cicatricial closure of the undermined portion has been

observed, but as the success of the iridectomy and even of anterior sclerotomy in certain cases, cannot be satisfactorily explained, conclusions must be based on experience.

That this operation does not open the angle in certain cases at last is shown by a picture of an eye with absolute glaucoma. The escape of aqueous has no influence on the permanent result of the operation, as it can be performed without emptying the anterior chamber and with as much prospect of success. It is probable that the reduction of intraocular tension is produced simply by the more or less permanent opening of the angle of the anterior chamber and not by the formation of a passage backward through the suprachorioidal space.

Results: Cases in which there is lasting benefit comprise 40 per cent of those operated upon, although for various reasons, it is too early to offer statistics. The course of a favorable case is as follows: Five to six hours after the operation the eye is usually hard and in the same condition as before; on the next day, however, the tension is somewhat lower, though still above normal. Exceptionally, even in favorable cases, tension remains unchanged until the next day. On the second, latest on the third day, all tension has disappeared, the eye may even be softer than normal, the anterior chamber restored, cornea clear and pupil round; usually the pupil remains wide and does not respond to eserine even when the eye is quite soft. It is not unusual to find hemorrhages in the retina after the operation, as is also the case after iridectomy. This may be attributed to the sudden lowering of tension.

The second group of cases in which the result of the operation is transitory, comprises about 30 per cent of all cases observed. The tension falls more slowly, but in less than a week returns. When the tension remains low for more than a week, the chances for a permanent cure are good, according to the author's experience.

The operation has been repeated on the same eye in only one case — absolute glaucoma, without success.

The third group, about 30 per cent, includes those cases mostly absolute glaucoma, in which the operation had no

effect whatever. The successful cases seem to have been both primary and secondary glaucoma, excepting those with *secusio pupillae* and *iris bombé*.

In secondary glaucoma following *ulcus serpens* with *leucoma adherens*, the operation has been successful even when the anterior chamber was too shallow to permit an iridectomy, and even when an iridectomy had been performed with subsequent return of tension. The author suggests the possibility of passing the spatula farther into the anterior chamber, and attempting to separate the anterior synechiae.

In one case only was the operation distinctly harmful, in an eye with iridocyclitis; apparently the pressure of the spatula increased the irritation of the ciliary body so that the glaucoma was aggravated. Iridectomy had been performed previously with improvement lasting only three weeks. Later the tension was permanently relieved by anterior sclerotomy.

Histories of forty-two cases are given which contain many instructive details, but which cannot be given in abstract. Two points are alluded to which require further consideration; namely, hemorrhage from Schlemm's canal and the effect of the marked hypo-tension which follows the operation in certain cases.

The cyclodialysis is not to be recommended in primary glaucoma, where iridectomy remains the operation of choice, but in cases where iridectomy has failed or is difficult and in many cases where one eye has been lost and in secondary glaucoma of all kinds, especially with lens dislocated into the vitreous. In a case of malignant glaucoma and one of hemorrhagic glaucoma, cyclodialysis was easily performed and was followed by normal or sub-normal tension.

C. W. C.

Discussion of Meller's Paper on Cyclodialysis, Before the Ophthalmological Society, Vienna, October 23d and November 13, 1907.

(*Archiv. für Augenheilkunde*, Vol. lix, part 1 and 3.)

Schnabel believed that the cases presented did not speak in favor of cyclodialysis, since in two cases, tension persisted

and in one hypotonus, another severe anomaly, was present, instead of glaucoma. He opposed the assumption of Heine that it was possible to separate the ciliary body from the ligamentum pectinatum in the glaucomatous eye. He thought that one must either go between Descemet's membrane and the substantia propria of the cornea, or else bore a canal through the substance of the adherent wall of the chamber. Because of the possibility of serious accident to the eye and because in certain cases there was an alarming hypotonus, he considered the operation not only an ill-adapted substitute for iridectomy, but not to be recommended because of its danger.

Salzmann opposed Schnabel's view because of the success of the cases presented, and which were operated upon successfully a year previously, and which had as yet shown no relapse.

Meller, at the next meeting of the society, presented two further cases of patients with glaucoma which he had operated on successfully by cyclodialysis. 1. A woman, aged 62 years of age, blind in both eyes, with high tension; the right eye had had an iridectomy; the left cyclodialysis. The iridectomy was followed by expulsive hemorrhage. After cyclodialysis, on the other hand, the pressure fell immediately after the operation, and in two days became normal and had remained so since. 2. In the second case operated seven months previously, the tension remained normal.

Meller then replied to the criticism made by Schnabel at the previous meeting. With regard to diminished tension, he denied that it was a serious anomaly, since, during its presence, the vision improved, and pain disappeared, while tension led inevitably to blindness. Moreover, hypotonus usually was transitory as pressure returned gradually to the normal. As for the causes of this condition, he excluded detachment of the chorioid and filtration through the scar, and suggested that a section of the long ciliary arteries and the ciliary nerves might be responsible for the diminished tension. He discussed the complicated mechanism by which the intraocular pressure

was regulated, referring to the evidence which Küsel had offered that the filtration of the aqueous into Schlemm's canal was hindered by the contraction of Brucke's part of the ciliary muscle and made easy by Müller's portion. Since the cyclodialysis is partial tenotomy of Brucke's muscle, the activity of this muscle would thereby be weakened and one might regard this as a favorable influence for filtration. With this explanation, he approached a theory which Schnabel had given for the efficiency of iridectomy: In cases in which iridectomy was performed with success, there was always a striking turning inward of the ciliary processes.

Speaking of the dangers of the operation, he advised, in order to avoid a possible separation of Descemet's membrane, that the passage between the sclera and the ciliary body should be first made with a dull instrument and the perforation into the angle of the chamber with a sharper one.

C. W. C.

ABSTRACTS FROM ITALIAN OPHTHALMOLOGICAL LITERATURE.

BY

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Polyganglionic Adenopathy of Parinaud's Conjunctivitis in a Case of Trachoma.

CARLINI, VITTORIO (*La Clinica Oculistica*, February, 1907). The affection of the lymphatic glands in connection with inflammation of the conjunctiva is not rare. In acute conjunctivitis the preauricular gland only is affected, while in syphilitic, tubercular and specially in Parinaud's conjunctivitis the parotid, the submaxillary and the cervical are all implicated. This is beneficial in arresting the infection by stimulating the activity of the cells of the glands and producing phagocytosis. According to Parinaud, the disease which takes his name is due to infection from domestic animals and specially the ox. The affection is so rare that from the first case reported in 1889 only nineteen others have been reported up to this time. The same is characterized by vegetations over the conjunctiva of different size, but specially by preauricular, parotid and submaxillary adenopathy. Suppuration was thought the ordinary consequence, although other cases have proved the contrary. The different anatomical findings and the different manifestations and results of the lymphatic glands have induced some authors to think the infection the result of various causes, and the polyadenopathy an incidental manifestation, an accidental concomitance of a particular virus when certain conditions prevail. This supposition is confirmed by the fact of having found the same ganglionic symptoms in a case of trachoma.

The patient, a girl 20 years old, was seen by the author while trachoma symptoms were developing in the right eye. A swelling very soon appeared in front of the right tragus. Few weeks afterwards the parotid, submaxillary

and cervical lymphatic glands began to swell until the side of the face became enormous. When trachoma developed in the left eye the preauricular gland of the same side became affected and consecutively the other lymphatic ganglia. The swelling lasted for about two weeks and then gradually disappeared. The conjunctiva continued to be trachomatous for a long time. The bacteriological examination revealed the presence of those cocci, which are normally found on the conjunctiva. The writer thinks that the polyadenopathy here as in Perinaud's conjunctivitis is due to staphylococcus infection, and not to a specific germ.

Contribution to the Treatment of the Dislocation of the Lens in the Anterior Chamber.

ALBERTOTTI, PROF. GIUSEPPE (*Clinica Oculistica*, April, 1907). Albertotti reports three cases, which have some resemblance, as in all of them there was posterior subluxation in one eye and dislocation of the lens in the anterior chamber of the other. The anterior dislocation was spontaneous and not traumatic, although in one case there had been a slight injury. The peculiarity of all of them is that the lens with the movements of the head easily passed in the posterior chamber from the anterior, to return in this latter when the position became favorable. This could be explained in the third case with a diminished lens and not in the other two with large ones. When these have been for some time in the anterior chamber they produce occlusion of the pupil and consequently impossibility to be displaced backward. Some authors have advised the reduction of the dislocation with massage of the cornea, but this method is only to be recommended when the zonula of Zinn is not lacerated, being only distended. The author recommends extraction of the lens as in cataract, this, according to him, being the only rational method of treatment in such cases. By doing so, in fact, he has obtained very little escape of vitreous, good healing of the wound, relatively good vision and permanently avoided the danger of iridocyclitis and secondary glaucoma.

Eyestrain in Relation to the Etiology of Pterygium and Tendency of This Latter to Relapse.

DE FALCO, DR. (*Clinica Oculistica*, April, 1907). The many operations for pterygium are all more or less destined to an unsuccessful result, very often the growth making its reappearance a short time after the operation. The author thinks that the cause of all this must be found in the different and false interpretation of the disease. According to him, this is due to vasomotor disturbances produced by the strain on the ciliary muscle, and not to mechanical agents acting on the conjunctiva (dust, foreign bodies on the conjunctiva), as has been thought by the majority of the other writers. Starting from this conception of the affection, Dr. De Falco has taken special care to paralyze the ciliary muscle by repeated instillations of atropine and cocaine, while the process of reparation of the wound following the operation is going on, at the same time using hypodermic injection of strychnine in the temples. In other words, the affection is of nervous origin, the fatigue on the ciliary muscle producing vasomotor disturbances on the conjunctiva. The relapse after operations are consequently due to the irritation of the wound which produces in certain conditions more vascular dilatation of the vessels of the bulbar conjunctiva. Rest of the ciliary muscle, absolute rest of the patient and antinervine treatment are most important for the success of pterygium operation, as the writer has proved in several cases.

Depression of the Posterior Ocular Pole Following Cataract Extraction.

FUCHS, PROF., Vienna (*La Clinica Oculistica*, May, 1907). Few years ago Prof. Fuchs of Vienna announced that often after cataract extraction, detachment of the chorioidea takes place. This fact is observed with the ophthalmoscope a few days after the operation (cataract ex., iridectomy), and specially when the anterior chamber, being formed, disappears again without rupture of the corneal wound. This detachment is smooth on the

surface, of dark color, not floating like the retinal, is observed on the nasal or temporal side of the fundus, disappears in a short time, while the anterior chamber becomes deeper and deeper. Prof. Fuchs explains this separation by admitting a laceration of the pectinate ligament, through which the aqueous humor passes in the suprachoroidal space between the sclera and chorioidea, thus pushing this latter membrane in the vitreous cavity. The laceration is very likely produced in incising the cornea before the lens has been extracted. Leber is of the opinion that the pressure of the eyeball in opening the cornea becomes low and that the orbital fat by pressing on the sclera produces an introversion of the same. Clinical observations have not confirmed this opinion, except in a case of cataract extraction. The anterior chamber which had been formed the day after the operation disappeared subsequently, without rupture of the corneal incision. The author thought to have to do with regular detachment of the chorioidea, but a careful ophthalmoscopic examination revealed none. Instead, a peculiar appearance of the fundus was present. Around the optic nerve and specially around the crescent of chorioidal atrophy (the eye was highly myopic) a circular line of dark color projecting in the vitreous was visible. The diagnosis was made by observing the parallaxic movements by noting the refraction of this particular line, and specially by the disappearance of the same gradually but completely in a short time. Then a true separation of the chorioidea in two places became manifest, which also disappeared after a few days. The depression of the sclera is explained by the author in this particular case considering that in high myopia this membrane becomes very thin and easily can feel the influence of the pressure of the orbital fat.

**Contribution to the Clinical and Anatomical Study of
Lymphoma of the Conjunctiva and Tarsus.**

BASLINI, DR. C. (*Clinica Oculistica*, May, 1907). The patient was 10 years of age and presented a drooping lid with the tarsal conjunctiva scattered with large

vegetations of the size of a pin head. The affection being unilateral, not resembling true trachoma, Perinaud's disease was suspected. This idea was soon abandoned, no swelling of the preauricular glands being present. The general diagnosis of granulations of the conjunctiva was made. The growth was removed by an intermarginal incision very deep between the skin and the tarsus from one canthus to the other. The lid regained its normal function, the cornea remained transparent, the internal surface where the conjunctiva was, after cicatrization became comparatively smooth. The microscopic examination revealed that the growth was a lymphoma of the conjunctiva and the tarsus.

Metastatic Purulent Panophthalmitis Due to Staphylococcus Pyogenes—Experimental and Bacteriological Researches.

CALDERARO, DR. (*Clinica Oculistica*, October, 1907). Ocular metastasis were of very frequent occurrence when the antiseptic methods were imperfectly known. Puerperal infection and post-operative suppurations were the cause. At present this affection is rare, owing to the better understanding of the means to prevent the spreading of infections from one part of the body to another. Virchow was the first to announce that the metastasis was due to an infective embolus stopped in the capillaries of the chorioidea. Axenfeld in 1894 came to the following conclusion:

In metastatic panophthalmitis there is often the complications of ulcerative endocarditis, the monocular being due ordinarily to slight pyemia, while in the binocular form the membrane most affected is the retina and the affection is very severe. In puerperal panophthalmitis he found the streptococcus pyogenes, in post-operative the staphylococcus, and in that of internal origin the pneumococcus. Although many other contributions have appeared after 1894, nothing important has been added to what was known through the researches of Axenfeld. It would be very important to study the germs which start the infection in the distant parts of the body and through what channels the infection passes to reach the eye. What we know at pres-

ent is that circumscribed purulent collections or diffuse ones must be the starting point of the ocular affection. There may be a primary infection of the eye, but even when we do not know the origin of the same, there must be a local infection somewhere in the body that only accurate investigations can discover.

Dr. Calderaro reports a case of this nature in which the starting point was on the face, where several small furuncles appeared. Short while after the O. D. began to inflame and then a yellow reflex was observed behind the pupil, the expression of suppuration of the internal membranes of the eye. Enucleation was performed and cultures from the blood and pus of the abscesses on the face and of the vitreous gave different results. Those from the blood resulted negative, while the others taken from the cavity of the eye and the small abscesses on the face showed the presence of staphylococcus pyogenes albus. According to the author, the germ most usually found in such cases is the staphylococcus pyogenes aureus, and although the examination of the blood has been negative, he thinks the metastasis takes place through veins and arteries under the form of bacterial emboli. These pass through the lungs, the heart and carotid into terminal capillaries of the retina and chorioidea where stopping, excite infection and suppuration. The reason why these emboli have a predilection for the capillaries of the internal membranes of the eye and not for those of the brain, is yet to be explained. Which of these ocular membranes participate more in this infective process? It appears by the microscopic examinations that the retina comes first and then the chorioidea.

Paralysis of the Ocular Muscles and Their Diagnostic Importance.

(Lecture held before the Medical Society of Strassburg.)

LAQUEUR, PROF. (*Clinica Oculistica*, October, 1907). To see in the proper sense is to bring the macula on the axis of the objects to be seen. The movements of the eye are so rapid and so precise that in any position this adjustment can be made with the least inconvenience, and all

this, by the action of the external muscles of the eye. The eyebulb situated as it is on the orbital fat and moving around its fixed point of rotation resents very easy the action of the muscles attached to it. The structure of these is the most delicate of the human body and its innervation the richest. Paralyzes of these muscles are recognized by objective and subjective signs (limited movements of the eye, strabismus, diplopia, changed position of the head). But isolated paralysis of the muscles of the eye and paresis without external manifestations are very difficult to localize. There are cases in which we cannot tell even which eye is affected. These paralyzes, as we well know, are in regard to their origin, orbital, basal, nuclear, fascicular and cortical. An orbital infection interests all the nerves of the eye muscles, and consequently the paralysis is complete. The same may be said of the affections at the base of the brain where the ocular nerves being one near the other and near the other cranial nerves, besides complete paralysis of the third, of the fourth, of the sixth, that of the fifth, of the seventh and optic nerve alterations will be observed. Partial paralysis of the ocular muscles cannot be but of nuclear origin, a fact which is explained by the disposition of the partial nuclei of the oculomotor on the floor of the fourth ventricle. A paralysis of the sphincter pupillae and of the accommodation alone, or one isolated of convergence, cannot be but of nuclear, these partial nuclei being most in front. It seems that ocular paralysis should furnish precious information in regard to cerebral affections. But unfortunately it is not so, and they are positively of less value than affections of the papilla and optic nerve in the diagnosis of localization and diseases of the brain. We shall mention what is known positively of these paralyzes in relation to the affections of the central nervous system.

1. In the first place comes *tabes dorsalis*, in which there is paralysis of the abducens and of branches of the oculomotor, more frequently the elevator of the upper lid (ptosis). These partial paralyzes last for some time and then disappear and are to be observed at the very beginning of the nervous affection.

2. Multiple sclerosis of the spinal cord is often preceded by optic atrophy many years before other symptoms make their appearance, and when the affection has become confirmed, then nystagmus and muscular paralysis under the form of associated paralysis (Perinaud) with the movements of convergence intact, may be observed.

3. In tumors of the pons there is crossed paralysis of the extremities and of the facialis, of the abducens and of the oculomotor on the same side of the affection.

4. Affections of the peduncle produce paralysis of the third and extremities on the opposite side of the cerebral lesion.

5. Tumors of the corpora quadrigemina produce bilateral paralysis of homonimi ocular muscles (both internals).

This sign can be utilized in company with others (paralysis of the pupil, nystagmus, incoordination, the erect position) to make a diagnosis.

V. L. R.

SOCIETY PROCEEDINGS.

SECTION ON OPHTHALMOLOGY, COLLEGE OF PHYSICIANS OF PHILADELPHIA.

Meeting February 20, 1908. Dr. Howard F. Hansell,
Chairman, presiding.

Chorioretinal Sclerosis.

Dr. William T. Shoemaker showed a *Case of Chorioretinal Sclerosis* limited to one eye in a male, aged fifty-three years. The vision of the affected eye was counting of fingers at 0.5 meter. The ophthalmoscopic appearance included a small spot at the anterior pole of the lens, and one on the posterior pole, from which came several remnants probably of the hyaloid. There were a few vitreous opacities, the disk was poorly defined and atrophic, with the vessels kinking slightly at the margin. Arteries and veins were greatly reduced, the arteries relatively more so. There was extensive chorioidal sclerosis throughout, with greatest concentration at the posterior pole, and several small patches of old chorioiditis. Pigment disturbance was mostly toward the periphery, and consisted of fine and coarse masses in the superficial layers of the retina. The sclerosed chorioidal vessels presented a striking appearance, being white, well defined, and well differentiated.

Dr. Shoemaker said that the causes of conditions of this kind were immediate and remote. The altered chorioretinal circulation might be but a visible expression of an extended or more or less general arteriosclerosis, such, for example, as might be found in senility or tertiary syphilis (two conditions which Frost considers of especial importance in this connection), or the changes might be purely local to the eye, and secondary to a diffuse chorioiditis or other process of similar destructive nature. In those cases which are purely sclerotic Frost believes the sequence within the eye to be: short ciliary arteries, superficial layers of the chorioid, and then secondarily the retina. He

charges degenerative disease in the short ciliary arteries with the immediate causation of the fundus changes, because, in the early stages these changes are limited to the neighborhood of the disk.

A water-color sketch of the fundus by Dr. Mary Buchanan was shown with the case.

Dr. Harlan said that the case recorded by Dr. Shoemaker recalled one that he had had under observation for a number of years. It was that of a middle-aged man, otherwise in good health and with no history or symptoms of specific taint. There was complete absence of uveal pigment in the fundus of the right eye, and some appearance of degeneration of the nerve. It seemed probable that the condition might be congenital, but recently there had been failure of vision in the other eye. The fundus of this eye seemed normal, but some months later changes commenced to be evident, and ultimately the ophthalmoscopic picture was the same as in the right eye. The chorioidal vessels did not seem to be changed. The patient retained enough vision to go on with his work as a railroad clerk. His daughter had always had defective eyes and was found to have complete aniridia in both eyes and cataract, chiefly posterior capsular, that prevented ophthalmoscopic examination.

Dr. Hansell believed the condition in Dr. Shoemaker's case was probably congenital, on account of the anterior and posterior polar cataracts and the limitation of the condition of one eye. Cases which developed in later life were usually binocular, although one eye might be more affected than its fellow.

Sinus Disease Simulating Osseous Tumor of the Orbit.

Dr. Burton Chance reported a *Case of Accessory Sinus Disease, with the Symptoms of an Osseous Tumor of the Orbit*. The patient was a lad aged fourteen years, who complained of weak sight and diplopia. There was no history of nasal disease or of injuries. The right eyeball was proptosed, and inward motion was limited by a hard, irregular mass, which protruded into the orbit, and extended forward to the anterior plane of the cornea. The mass was not

sensitive on firm pressure. Vision in this eye was reduced and the optic disk was pallid; the nasopharynx was healthy. A diagnosis of osseous tumor was given, which was concurred in by a general surgeon, and immediate removal of the tumor was advised. In the dissection the surface of the tumor was broken, and great quantities of thick tenacious mucus exuded. The opening was found to lead into the ethmoidal sinus, and the cavity extended beyond the median line and into the frontal sinus. The walls of the cavity were curetted, and an opening made into the nose, through which drainage tubes were inserted and brought out through the nostril. Prompt recovery ensued, and after two years the eye was found to be in its normal position and to have full action. The optic disk had a healthy color, and the vision was fully restored.

Dr. Harlan had had a case somewhat like the one described by Dr. Chance. There had been fracture of the bridge of the nose some years before. Examination showed a tumor, larger than a pea, at the inner angle of the orbit, which was so hard that it seemed like an ivory exostosis. Nothing abnormal was found in the nose. In attempting to remove the tumor, the knife penetrated it, and there was a gush of pus from an ethmoidal abscess. An opening was made into the nasal chamber, and a drainage tube passed through and brought out through the nose. This was held in place by a delicate wire, and the wound was completely closed. After antiseptic irrigation through the tube for a short time, a complete cure followed.

He thought it was well to keep a sharp lookout for these sinus complications, as they are a frequent source of difficulties and mistakes in diagnosis. Some years ago a patient came to him with lacrimal obstruction. The epiphora was relieved by probing, but soon afterward, slight exophthalmos was noticed, and there was a good deal of pain. An orbital tumor was suspected, and, in consultation with Dr. Wm. F. Norris, an exploration was made through an incision below the eyeball, but no cause for the proptosis could be found. Later a family history of cancer led him to suspect the antrum, and Dr. MacCoy, after examination by transillumination, said there was a growth in the antrum, which

extension of the disease soon made quite evident. The patient finally died of exhaustion. There was no autopsy, but he had no doubt that there was a sarcoma of the antrum.

Dr. Shumway called attention to the fact, which has been referred to by various writers, that absence of the nasal symptoms and of discharge from the accessory sinuses did not exclude the possibility of empyema or mucocele of those cavities. He reported briefly two private cases, one of whom showed partial optic atrophy and evidence of interstitial neuritis, with permanent reduction in visual acuity to 6/12 which was the result of empyema of the sphenoidal and posterior ethmoidal sinuses; and the other a patient with severe headaches and asthenopic symptoms, whose symptoms were largely relieved by the draining of a large mucocele of these cavities. In neither case had there been any discharge or other symptoms to call the patient's attention to possible nasal disease. Dr. Shumway said that pain in the head, due to accessory sinus disease, was often quite characteristic in being made worse when the patient jumped up and down on his toes, or leaned forward with the head down.

Dr. Hansell said that the importance of the relationship of diseases of the accessory sinuses to diseases of the eye, particularly of the optic nerve, was becoming more and more appreciated. It should be remembered that the chiasm and the intracranial portion of the optic nerve are partly surrounded by the sphenoidal cells and separated from them, in some individuals, by extremely thin bone, and in the orbit the walls of the ethmoid cells, also paper-like in thickness, are almost in contact with the optic nerve. Disease of these cavities leading to collection of pus and bulging of their walls may readily induce optic neuritis and optic atrophy by pressure. He referred those interested in the anatomy of these parts to the illuminating monograph by Dr. A. Onodi, *Der Sehnerv und die Nebenhöhlen der Nase*, 1907.

Operative Measures to Restore Orbital Defects.

Dr. Chance also described the conditions present and his

operative attempts to repair the effects of great destruction of the lids and orbital tissues caused by disease of the antrum. Through necrosis of the roof of the antrum the disease invaded the orbit, involving all the tissues and the lids by extensive cellulitis. The eyeball, too, was infected and had to be removed. When Dr. Chance first saw the patient the orbital tissues were matted together, forming numerous pockets filled with fetid pus; the lids were distorted and drawn into the orbit, and a sinus led from the orbit through the lower lid onto the cheek. The antrum drained imperfectly through openings into the nose and into the mouth. The operative procedures consisted of repeated severing of the adhering bands, the breaking up of the pockets in the orbit, the opening of the nasal duct, and draining the orbit through the duct, and through the sinus in the lid. Lead plates were used to keep the lids from contact with the orbital tissues, then the sinus in the lid was closed. Later operations were done upon the distorted lids, and subsequently a gold ball was inserted in the orbital mass. Because of luetic infection a year or so before the antrum became diseased, and because of the antiplastic value of mercury, inunctions of it were applied for several weeks during the stay in the hospital. A month or so after the patient was discharged the result obtained showed a clean, smooth, and rounded socket, to the lower portion of which the lower lid was partly adherent, and over which the upper lid hung quite naturally. The nasal duct afforded complete drainage, and the antrum disease had entirely subsided.

Quinine Amaurosis.

Dr. Carl Williams presented a paper on a *Case of Quinine Amaurosis*. (Published in full, *Annals of Ophthalmology*, January number.)

In discussion, Dr. D. F. Harbridge (by invitation) reported three cases which he had seen two years before. The patients were sailors who had been given large doses of quinine for chills, while aboard ship. They became very ill, and when examined in the hospital in Chester, Pa., one was found to be totally blind, the second blind in one eye

and nearly blind in the other, and the third to have much reduced sight in both eyes. The eye grounds showed very pallid nerve heads, and vessels reduced to the size of threads. He had had only a slight opportunity of examining them before they were deported, and was unaware of the amount of quinine administered.

Neuroma of the Orbit.

Dr. Howard F. Hansell reported a *Case of Neuroma of the Orbit*. He said that under the general head of "Neuroma" were included all kinds of tumors which originate in or upon a nerve trunk, and which are composed, at least in part, of hyperplastic nerve fibers. The term should be limited to those tumors in which the nerve fibers greatly overbalance other kinds of tissue. The neuroma-like tumors comprise the plexiform, the fibrous, the myxomatous, the ganglionic, and the gliomatous. True neuroma of the orbit is an extremely rare affection, according to the writers on the subject, and yet, if in structure and symptoms it may be compared with neuroma after amputation of a limb, it is a matter of surprise that many cases are not encountered and reported. The patient was a young woman who four years ago had orbital abscess, exophthalmos, and necrosis of the roof of the orbit. The eye had been enucleated and several operations performed in a foreign hospital for the relief of intense pain in the orbit and head by scraping away the necrosed bone and loosening the cicatricial bands. In March, 1907, the supraorbital nerve was dissected out from the anterior orbital margin to the apex of the orbit at the Jefferson Hospital. For five months there was no recurrence of pain. During the fall the attacks returned with less violence and frequency. In January, 1908, a large cicatrix at the roof of the orbit was excised and a graft of skin, taken from the inner aspect of the thigh, transplanted, with the result of again relieving the pain. Examination of the excised supraorbital nerve showed a swelling the size of a bean, in its central portion, of the same color and texture as the nerve. The tumor had no ramifications and was not attached to any of the adjoining structures.

Meeting March 19, 1908. Dr. George C. Harlan, Chairman *pro tem.*, presiding.

Tuberculosis of the Iris.

Dr. Wm. Campbell Posey exhibited a young colored man with tuberculous deposits in the anterior chambers of both eyes. The tuberculous mass in the right eye was unusually large, half filling the anterior chamber. A general reaction had been obtained by a 2 mg. dose of tuberculin. There were no other evidences of tuberculosis in the system.

Electric Burn of Eyes.

Dr. Wm. M. Sweet presented for Dr. Howard F. Hansell a *Case of Burn of Both Eyes by Electricity*. The patient was a man, aged thirty-five years, the victim of an accident. While he was sawing an electric light cable, capable of carrying a current of 500 volts, the current was suddenly turned on. A flash of light was emitted from the points of contact of the cable and saw, burning off eyebrows, eyelashes, and moustache, and scorching the entire face and both lids. Upon admission to the Jefferson Hospital, the skin of the face was discolored a dark red and was edematous. The lids were distended by edema so that they could be separated with great difficulty. The conjunctivas were inflamed and the corneas opaque. For the first twenty-four hours ice compresses were used and afterward hot compresses were substituted. He was ordered atropin, holocain, and carbolized vaseline. The epithelial layer of the cornea of each eye became necrosed and was discharged. The epithelium of the conjunctiva remained intact. The right eye recovered promptly, healing with only a superficial scar. The left partly recovered and relapsed several times, owing to the destruction of the corneal nerve and insensibility of the exposed surface. The treatment carried on at present consisted in the use of atropin and the constant wearing of a bandage over the left eye.

Pseudoglioma.

Dr. Edward A. Shumway exhibited a *Case of So-called Pseudoglioma* in a boy, aged fourteen years. No history of

traumatism or infectious disease could be elicited. A connective tissue mass occupied the lower and inner part of the vitreous, from which delicate membranes could be followed to the upper part of the fundus. The chorioid above showed fine pigmented lesions. Dr. Shumway spoke of the differential signs between pseudoglioma and tumor, and believed the condition to have been a non-suppurative infection of the uveal tract, due to an organism of comparatively low grade virulence.

Macular Homonymous Hemianopsia.

Dr. Wm. Campbell Posey reported a *Case of Right Homonymous Hemianopsia in the Macular Regions*, occurring in a male, aged fifty-six years. The visual defect had occurred in an apoplexy which was unattended by other symptoms and had persisted without change for the four years the patient had been under observation. Central vision was normal in each eye and the peripheral fields of vision were also normal, the only loss in the fields being small triangular areas to the right side of fixation.

Dr. Posey said that he had been instigated to report this case by a recent paper of Wilbrand, in which eight cases of this unusual loss in the fields of vision had been recorded, and after calling attention to the difficulty in reading which the defect occasioned, passed to the consideration of Wilbrand's negation of von Monakow's views of macular representation.

Wilbrand explained the lesion by a blocking of an end artery in the visual area of the cerebral cortex, although in one of his cases the lesion was occasioned by the penetration of a screw in the region of the cuneus.

Dr. Posey referred to Mills' observation of two cases of macular hemianopsia ten years previously, and to this well-known authority's conclusions regarding the entire subject of macular cortical representation.

Muscle Palsies in Graves' Disease.

Dr. Posey reported in addition *Two Cases of Palsy of Extra-ocular Muscles in Graves' Disease*. Both patients were females, exhibiting other characteristic signs of the disease. The

right superior rectus muscle was palsied in one case; both external recti, the left superior rectus, and inferior oblique muscles in the other. The writer referred to a previous paper by him upon the subject and said that palsies of the extra-ocular muscles in exophthalmic goitre were not extremely rare and were to be regarded not as accidental, but rather as a part of the morbid process of Graves' disease.

Interstitial Keratitis with Cretinoid Conditions.

Dr. Samuel D. Risley presented the histories of *Two Cases of Parenchymatous Keratitis* with somewhat unusual local and systemic symptoms. No signs of either hereditary or acquired syphilis could be traced with any plausibility. Persistent treatment by the usual well-known methods afforded no relief. The general symptom complex suggested a cretinoid or myxedematous complication. He then directed the general treatment to this systemic cachexia, continuing the same local measures which had before been used without result, and rapid improvement followed.

Dr. Pyle called attention to the fact that Dr. Risley's interesting cases furnished additional evidence to support the growing disposition to challenge the long-accepted dogma of Jonathan Hutchinson, that hereditary syphilis is almost invariably associated with interstitial keratitis. He was in thorough accord with the modern idea that any profound metabolic disturbance may produce organic disturbances analogous to those caused by inherited syphilis. Several European authorities go so far as to say that inherited tuberculosis or extreme tendency to tuberculous infection is more often associated with juvenile interstitial keratitis than is congenital syphilis. When at a loss for definite etiological data, too often is there a gratuitous assumption of hereditary syphilis. Many patients so classed would show much more rapid improvement under the modern advanced dietetic and hygienic treatment of the American school of pediatrics than ordinarily follows the old-fashioned mercurial inunctions and continued administration of iodine compounds. Dr. Risley has offered an important thought in his suggestion of the necessity of thyroid treatment when there is disturbance of this gland,

in addition to the therapeutic measures directed to the original underlying dyscrasia.

Dr. Jas. B. Neal said that in his practice and that of his colleagues in China many cases of interstitial keratitis were observed following attacks of acute diarrhea, which were common in the rainy season. Many were certainly not due to inherited syphilis. In these patients he obtained the best results by treatment first of the diarrhea, and then by administration of tonics, such as codliver oil, iodide of iron, and other remedies which would improve the general health.

Dr. Ziegler spoke of the increasing tendency to hunt carefully for possible perversions of metabolism in treating local inflammations, and of the great disturbance of the entire organism when the thyroid gland was not functioning properly. There was also a tendency to use thyroid extract even in diseases not directly of thyroid origin, in order to encourage the reestablishment of the normal metabolism. He had been using it for two years past in cases of interstitial keratitis, whether of syphilitic origin or not, as they always responded more readily to this treatment. He had also found that cases of subretinal hemorrhage were greatly improved by this treatment.

Dr. Zentmayer said that, notwithstanding our broadened etiology, he still believed that inherited syphilis was the principal cause of interstitial keratitis, as in his experience the number of cases of interstitial keratitis which showed the other stigmata of inherited syphilis—the notched incisors, rhagades, scaphoid face, and deafness—left but a small number to be divided among other possible causes.

Dr. Pyle said that these so-called associated stigmata of hereditary syphilis, to which Dr. Zentmayer had referred, may all be seen in cases of juvenile tuberculosis, and even in the lesser marasmic disturbances of general nutrition.

Dr. Shumway said that, in treating cases of interstitial keratitis, it was important to remember that not only the cornea, but the entire uveal tract, was usually involved, and as more and more cases of chorioiditis were proved to be dependent upon disturbances of metabolism, with the production of auto-intoxications, the ophthalmologist should bear these facts in mind and hunt for similar con-

ditions in obscure cases of corneal disease. Examination of the urine may discover products of faulty elimination, and the correction of such faults will lead to a more rapid improvement of the local inflammation.

Dr. Risley emphasized, in closing, the opinion expressed in his paper that the same cause which produced the corneal disease in his cases had produced the impairment of the function of the thyroid gland, and referred to its now well-known influence over the general metabolism. The impairment of the thyroid function, therefore, however produced, reacted in turn upon both the general condition of the patient and the local manifestation in the cornea, thus establishing a vicious circle. Treatment with the thyroid extract, caused an immediate improvement when other remedies had failed.

Congenital Defect in the Chorioid.

Dr. Reber exhibited a *Case of Probable Congenital Defect in the Chorioid*, occurring in a colored boy, aged twelve years, who was healthy in all respects and the subject of no congenital defects other than the one suspected in the eye ground.

There was a vague history of an injury to the eye three years before, by the premature ignition of some unconfined powder, which went off with a puff. The description given by the patient and his mother of ensuing inflammation indicated that there was nothing more than a slight burn of the anterior ocular structures.

The eye ground showed a normal nerve head. Situated in the macular region was a white area, a little larger than the disk, which looked much like piled up exudate; its surface seemed uneven and full of little hummocks, the whole area being elevated about 2 diopters. The retinal vessels traversed this area without any break, but seemed to rise up over its edge. A broad area (3 disk-diameters) adjoined the white area at its upper side and reached out temporalward 3 dds. farther, in white splotchings of a "passover bread" effect.

Far out in the temporal field, full 3 dds. beyond the white area alluded to, were 7 or 8 ampulliform dilatations of the

retinal vessels, each one 2 to 3 times the width of a retinal vein. They all surrounded, more or less, a peculiar circular dilatation, $3\frac{1}{2}$ retinal veins in diameter, which had a darker hue than the others. Dr. Reber reviewed the different causes and conditions that might possibly account for this extraordinary picture, and by exclusion decided that it was, in all probability, a congenital picture.

It was pointed out that it might be either an atypical congenital defect in the chorioid or the result of an intra-uterine inflammation; but the writer leaned toward the idea that it was a congenital defect.

Dr. Pyle referred to a recent paper read by him before the Section, which considered the etiology of intra-ocular colobomata and other congenital anomalies, and called attention to the fact that speculation as to preservation of the retinal elements was superfluous. If the retinal elements were absent, there would be found in the field of vision scotoma corresponding to the colobomatous area; if the retina was intact, there would be no such colobomata. For various reasons, Dr. Pyle was by no means convinced that Dr. Reber's case was one of *congenital* anomaly.

Dr. Posey said that while he disliked, from a single observation, to conflict the views of Dr. Reber, who had studied the case long and frequently, it did not seem to him that the condition could be properly designated a coloboma. A coloboma meant to him a defect and perhaps an ectasia in the eye, whereas in Dr. Reber's case the area in dispute seemed to him to be raised and more of the nature of a mass, the product of a proliferating retinitis. He had never seen a vascular condition similar to that observed in the fundus of the case under observation, and regarded it and the retinal mass as of probable congenital origin. Dr. Posey said that while it was true that observers had disclaimed that the fovea lay in the fetal fissure, there was embryonal evidence that it was connected with the fissure by a kind of accessory fissure. He pointed out that the fetal fissure was particularly prone to inflammation, both by reason of its richness in pigment and of the proximity of the retinal blood vessels.

Dr. Ziegler agreed with Dr. Posey's statement that the use of the term coloboma implied the presence of an ectasia. Such a condition, however, was not present here, in his opinion. Measurement with the ophthalmoscope and the parallax at the edges of the lesion showed an elevation of at least 3 diopters. The vascular ampullae resemble cirroid aneurysm, but have no pulsation, and, therefore, could not be designated aneurysms. There is, however, undoubted evidence of subretinal hemorrhages with subsequent absorption and deposit of pigment. Possible compression of the head at delivery might account for all these lesions.

Dr. Risley had studied the ophthalmoscopic picture presented by Dr. Reber's patient with much interest. He did not think the case was one of coloboma of the chorioid. He could not determine any elevation or depression of the chorioidal lesion. The appearance he thought was that of an atrophic patch following a chorioidal hemorrhage or an attack of acute localized retinochorioiditis, which, in its acute stage, is occasionally accompanied by great edema and infiltration of the surrounding retina and chorioid which obscures all details. After the infiltration has disappeared a chorioidoretinal lesion, similar to that shown in this case comes into view. A few years ago he presented to the section the history of four such cases. The history of Dr. Reber's case he thought must of necessity be left to conjecture.

In closing the discussion Dr. Reber called attention to the fact that he had classed the case as one of probable congenital, circumscribed defect in the chorioid, and it still seemed to him that this was the likeliest possibility. Such conditions were so rare, that it was wrong to dogmatize until we arrived at absolutely definite ideas as to where congenital defects leave off and the results of intra-uterine inflammation begin.

The Restoration of Contracted Sockets.

Dr. William Zentmayer read a paper on the *Restoration of Contracted Sockets*. One case had been successfully treated by the use of a Thiersch graft which had been spread upon a large glass sphere, such as is used in the Mules' operation,

the epidermal surface was placed in contact with the glass and the globe so introduced that the graft was brought in apposition with the raw surface produced by dissecting out the cicatricial tissue.

The second case was operated upon after a method devised by Dr. Conrad Berens, of the Wills Hospital Staff. In this instance wearing of an artificial eye was prevented by two cicatricial bands which extended from near the margin of the upper lid back to the equator of the socket. Having selected the more extensive of the bands, it was grasped deeply by fixation forceps near one of its attachments, and with a stout curved needle a suture was carried beneath it. It was next seized in a like manner at the other end of its attachment and similarly transfixed by a suture. With a pair of straight scissors the band was then divided midway between the two sutures. This left two free opposed raw end surfaces with an intervening regular raw bed surface. Grasping the ends of one of the sutures, the assistant seized the corresponding cut end of the band and raised it from its bed so that the suture could be tied across the face of its raw end, thus inverting and tucking in the cut edges. The other suture was tied in a similar manner. The intervening raw surface was then covered in by bringing its edges together with a suture. One week later the second band was treated in a like manner. By slowly increasing the size of the artificial eye the patient is now able to wear one of moderate size. The surface of the socket is at present smooth.

Dr. Posey said that he had recently performed this operation on a case at the Wills Eye Hospital, and believed it to be especially adapted to cases in which the bands of adhesion were not too broad.

Dr. Harlan thought that the great difficulty in these cases is the absence of a conjunctival sulcus. If the cul-de-sac is not involved and a probe can be passed behind the contraction the case is comparatively easy to treat, but if the cicatricial contraction involves the cul-de-sac, the oftener an incision is made in it the greater is the subsequent contraction, which, in his experience, always forces out anything placed in the orbit to oppose it. He had attempted to establish a sulcus by inserting a stout lead wire, leaving

it in position for several months until the sinus that it forms has dermatized, and then cutting down upon it and inserting a lead disk. In several bad cases he had succeeded admirably, particularly in one whose photograph he had shown to the Section a few years ago, but subsequently he had not been so successful. He was not quite convinced, however, that the principle was not a good one, and is waiting for a favorable case to make another trial. He had since learned that Himly has proposed a similar treatment for total symblepharon.

Dr. Pyle expressed his interest in the ingenious operation described by Dr. Zentmayer, and was decided to try it at the first opportunity. However, he agreed with Dr. Posey that it would likely not be sufficient in cases with very thick bands of adhesion. In his experience with plastic conjunctival operations after enucleation, he had been impressed by two points: First, the great value of using analogous grafts from the buccal and oral mucous membrane. Second, the gratifying results following gradual and progressive stretching of the enucleation-cavity by lead-ball prosthesis. The size of the inserted balls is increased weekly during several months.

Meeting April 16, 1908. Dr. Howard F. Hansell, Chairman, presiding.

Rupture of an Artificial Eye.

Dr. S. D. Risley exhibited a reformed artificial eye in which a rupture of its posterior concave surface had occurred suddenly while the patient was facing a cold wind. The soft tissues had been drawn into the central pear-shaped window, caused by the rupture, so forcibly as to cause severe pain and make removal of the eye difficult. He believed the accident was due to the deviation in the radius of curvature between the two surfaces of the eye produced by the sudden change of temperature of the exposed convex surface. The contraction under cold he thought would tend to shorten the anterior surface, which could not occur without traction upon the periphery of the attached posterior concave surface, which would tend to straighten it like a bow-string. The rupture of its surface

which occurred at its center was balloon shaped, and the outlines of the opening were approximately concentric with the peripheric outlines of the eye.

Ocular Symptoms of Ethmoidal Disease.

Dr. Frederick Krauss presented a paper on the *Ocular Symptoms of Ethmoiditis*, in which he urged early diagnosis and operation before serious symptoms of pus along the course of the optic nerve appear.

He cited four cases of various types of the disease. After a review of the symptomatology, the author described an operation for the tumor of posterior ethmoiditis, which consists of the formation of a channel beneath the periosteum extending from the incision (along the superior and inner orbital margins) to the growth. The carious areas are thoroughly curetted and a large opening made into the nose, through which a drainage tube is passed. The wound is then stitched. As healing takes place by first intention, the resulting scar is practically imperceptible.

Dr. Posey said that it needed but a glance at the current literature to convince one that the ocular manifestations of disease of the accessory sinuses was receiving the recognition which this phase of ophthalmology demands, a recent number of the London *Ophthalmoscope*, for example, being given over entirely to the subject. While Dr. Krauss' paper was most instructive and gave original interpretations to many of the conditions encountered in orbital disease from sinus affection, Dr. Posey did not believe that it was possible to create a symptomatology for any particular sinus or set of sinuses. The extent of the sinuses was often so anomalous and their position so varied that the symptoms of disease of the various air cells frequently merged into one another. Again, inflammation of a sinus might set up ocular symptoms remote from the sinus, and he had noted edema of the upper lid as the only ocular symptom of antral disease. In a paper which he had read some years ago Dr. Posey said that he had called attention to the involvement of the optic nerve which is present in even beginning cases of sphenoiditis and ethmoiditis, as evidenced by a lowering in the light sense, and by the choking of the lymph streams

along the retinal vessels. He had frequently noted asthenopia in connection with disease of the sinuses and pointed out that in marked cases of orbital involvement the shape of the globe itself may be altered by pressure, but that even in less marked acute cases he had noted a change in refraction, due apparently to vascular or innervational changes or to the action of toxins generated by the disease of the sinuses, upon the accommodation, which, he had been unable to determine.

Dr. Zentmayer said that he quite agreed with Dr. Krauss as to the importance of publishing such cases as he had presented in his paper this evening, because, notwithstanding that the subject has been dwelt upon considerably in recent literature, palpable cases were still continually overlooked. Last January there came to Wills Hospital a man, aged twenty-four years, who stated that in September, 1907, he first noticed that his right eye was becoming prominent, and that in two weeks' time the bulging was very pronounced. His only illness has been grippe five years previously. He was not subject to colds in the head, but had had frequent nose bleed as a child. He had absolutely no other nasal symptoms.

The proptosis was very marked, the lateral excursions of the globe were somewhat restricted $V. = 1/3$; light sense was disturbed, but there was no central scotoma. The inner margin of the disk was veiled and the lymph sheaths were distended. His accessory sinuses were examined by Dr. Marshall, whose immediate report, after thorough constriction of the mucous membrane with adrenalin and cocaine, was that there seemed to be nothing wrong. The next day, however, the patient reported that a fetid purulent discharge had appeared in the nose. This has continued, and with it there has been a steady improvement in all symptoms.

According to his physician the patient had been treated by a local ophthalmologist for dacryocystitis, and was using for it a zinc wash.

Dr. Risley was convinced that we were just beginning to appreciate the grave significance of many affections of the eye associated with disease of the nasal passages and the

accessory sinuses contiguous to the orbits. Since the publication of his paper presented to the Pennsylvania State Medical Society, at York, Pennsylvania, in September, 1903, he had become more and more deeply impressed by their importance. He had been unable to relieve many cases of persistent and rebellious asthenopia and other affections of the eye until the inflamed and blocked sinuses had been relieved and referred by way of illustration to one striking instance with persistent and violent headache, swelling of the optic nerves, and contracted fields of vision in a patient who had finally been relieved only after amputation of the middle turbinates, which was immediately followed by a profuse discharge of pus from the ethmoidal cells.

Dr. Hansell said in all cases of apparently idiopathic optic nerve atrophy he was accustomed to have a careful examination made by a rhinologist, and believed a large proportion of such cases was due to disease of the sphenoidal sinus. Many cases show nothing at a first examination, but reveal extensive involvement subsequently. Asthenopia had not been a prominent symptom, in his experience, but more often reduction of visual acuity, and alterations of the fields, with scotomata.

In-closing, Dr. Krauss said, in reply to Dr. Posey's remarks, that it was not always possible to differentiate between posterior ethmoiditis and sphenoidal sinus disease, but that posterior ethmoiditis was probably the one which most frequently gave rise to the more striking ocular symptoms. The variation in the severity of the symptoms of the different sinus diseases is due to the fact, as pointed out by Onodi, that the bony septa between the sinuses and important ocular structures vary greatly in thickness. Venous and lymphatic communications are also important factors.

Nevus Removed by Electrolysis.

Dr. Risley presented a patient with a large nevus of the left lower eyelid upon which he had operated four weeks before by electrolysis. A single operation had resulted in a nearly complete restoration of the part without any deformity resulting from the displacement of the eyelid. He

had often employed electrolysis in nevus and other affections, but in this case had adopted a different procedure. Instead of placing the positive pole on the cheek or back of the neck, with the negative pole in the tumor, both needles were thrust into the growth from opposite sides, parallel to each other and close to its base, about 3 mm. apart, and allowed to remain approximately one minute. The tumor was then coated with collodion and a compress bandage applied. The absorption was rapid and complete; at the end of four weeks only a slight doughy thickening and some discoloration remained.

In answer to a question by Dr. Hansell, Dr. Risley said he thought the action of the electrolysis was more effectual in using the two needles than when he had used the single needle attached to the negative pole.

Dr. Posey said he had used the Wyeth method of injecting boiling water into a vascular nevus, in one instance several applications being necessary. He had also employed electrolysis, but had used only one needle.

Gonorrheal Uveitis.

Dr. Howard F. Hansell exhibited a patient with *Gonorrheal Uveitis*. The patient was a sailor, aged twenty-two years, who five years earlier was confined to bed for three months with articular rheumatism. Two years ago he had specific urethritis, followed by articular rheumatism and inflammation of the eyes one month later. The ocular disease, judging from his description, was iritis or iridocyclitis. He was admitted to the Philadelphia Hospital February 22, 1908. Two weeks earlier he had a second attack of gonorrhea, followed in a week by rheumatism and in ten days by ocular inflammation. The latter corresponds closely with Byers' description of the gonorrheal type of iritis (*Studies from Royal Victoria Hospital*, Montreal, February, 1908), presenting the numerous and plainly to be seen deposits on the lower half of Descemet's membrane, the unusually deep anterior chambers, and the moderate amount of iritic exudation. The synechiae in the right eye have been completely torn away by the treatment and V.=20/20. Vision in

the left eye is decidedly lowered on account of large and dense opacities in the vitreous. The left was the more intensely inflamed eye, as is shown both by the annular synechiae and the exudation into the vitreous. Examination of the aqueous humor of the left eye showed no gonococci, only the xerosis bacilli, probably derived from the conjunctiva. Two cultures made from the blood were also negative. The treatment consisted in the use of the salicylates in large doses and daily sweat baths, and, locally, atropin and hot compresses.

It is impossible to state, even with approximate accuracy, the proportion of uveitis of gonorrheal origin, but taking the average of figures given by different authors, 10 per cent. or 15 per cent. may represent its frequency. Statistics are bewildering, since many of the cases ascribed to rheumatism and syphilis should be classified as gonorrheal. Moreover, some clinicians have not considered gonorrhea as a possible cause, and no mention is made of this disease in their lists.

Opportunities for studying the pathology are rare, for the eyes affected seldom come to enucleation. The prognosis is almost uniformly favorable including those cases in which the anterior chamber contains at the height of the inflammation a membranous and gelatinous deposit, and vision is reduced to the perception of light. As in most instances of iritis from this and other causes, the inflammation is not limited to the iris, but includes the ciliary body and the anterior portion of the chorioid, and is essentially a cyclitis or iridocyclitis. We have acquired the habit of designating an anterior uveitis as iritis, because probably the changes in the iris are evident, while those in the ciliary body and chorioid are hidden.

Dr. Frescoln, of the Philadelphia General Hospital, said that the gonorrheal discharge was profuse, and when it ceased the eyes improved at once. In one blood culture diplococci seemed to be present, but subsequent cultures were negative.

Dr. Posey showed a man, a negro, aged thirty years, with pronounced uveitis in both eyes, in whom he thought the

ocular inflammation might have been caused by gonorrhea, as the patient had had a urethritis in the autumn, and synchronous with the appearance of the ocular symptoms a month previous to consultation there had been rheumatic pain in the shoulders, and there was now some enlargement and thickening of the sterno-clavicular articulations. The interstitial lamellae of both corneae, were densely infiltrated with exudate, so that the irides could barely be seen. Dr. C. Y. White had made one negative blood culture, which was not considered conclusive of the non-gonorrheal origin of the inflammation. Acquired syphilis was denied, but congenital lues could not be excluded.

An Unusual Form of Congenital Squint.

Dr. Wm. Campbell Posey reported an *Unusual Form of Congenital Squint* occurring in a boy, aged fourteen years. The face was symmetrical, the lower part being markedly underdeveloped, the chin being small and receding. The left orbit appeared broader than its fellow and the corresponding side of the face was flattened. The palpebral fissures were obliquely placed, both external angles being directed down and out. The arch of the palate was high, but the teeth of both jaws were all present and regular.

Both eyes appeared of equal size. The right pupil was 3 mm. in size, the left 4 mm. Both irides reacted well to light and accommodation stimuli. O.D.V. equalled 6/5; O.S.V. but finger-counting at 1 m. H. equalled 1 D in each eye. There were no changes in the fundi.

When fixing, the left side of the face presented and both eyes were focussed upon the fixing object. When the head was brought into the primary position, however, and the patient asked to fix, the right eye alone fixed, the left deviating somewhat downward and outward. When the fixing object was carried to the left, the left eye fixed, and the right shot up and in, due to an overaction of the right inferior oblique. When, on the other hand, the examining object was carried to the right, the right eye fixed, and the left shot up and in, the upward and inward deviation being

more pronounced than that observed in the right eye when the eyes were directed to the left.

In the left monocular fixation it was noted that inward motion in the median line was abolished, that upward and inward motion was poor, while downward and inward motion was well conserved. Motion directly upward was excessive, while straight downward motion was limited; downward and outward motion, as well as outward motion in the median line, were normal. In monocular fixation of the right eye all the movements of the eye appeared to be normal. Movements of the jaw had no influence upon the ocular excursions or movements of the lids.

Dr. Posey thought that the limitations of movement in the left eye were best explained by complete absence of function in the left internal and superior rectus muscles, and by a partial loss in the inferior rectus muscle. Advancement of the left superior rectus muscle was advised, with a view to bringing the left eye into normal position in primary fixation, other procedures to be resorted to later, after the eyes had adapted themselves to the changes effected by the advancement.

The particular grouping of the muscular insufficiencies exhibited in this case has never before been encountered by the writer, the deviations differing from any of those observed in the seventy cases of congenital squint which were reported by him before the Ophthalmological Section of the American Medical Association last year.

Dr. Posey thought, however, that the deviations might be explained either by a partial palsy of the left third nerve as a consequence of pressure in its passage through an abnormally small orbital fissure in the imperfectly developed skull, or to structural anomalies in the muscles themselves, with perhaps the formation of fibrous bands, as has been discovered in other not very dissimilar cases.

Traumatic Rupture of the Chorioid.

Dr. Frederick Krauss presented a case of *Traumatic Rupture of Chorioid* in a girl, aged fifteen years, who was struck

in the right eye by a stone from a slingshot. The following day the vision was $1/40$ of normal. The ophthalmoscope revealed enormously dilated retinal veins. The disk edges were indistinct. The retina was very hazy, especially about the disk, and below and out to the macula. In the macular region there was an irregularly shaped hemorrhage, running through the center of which was a triangular shaped rent of the chorioid. The left eye was normal. Two days later, under atropin, the pupil dilated oval, but was eccentrically placed, owing to the fact that the temporal side of the iris refused to dilate, probably due to overfilling of the bloodvessels of the iris and ciliary body. There were no synechiae.

One week, after the accident the haze of the retina had partially cleared, showing a second semicircular rent of the chorioid, extending from a point midway between the disk and macula, parallel to the disk downward. The macular rent had greatly increased in length. Beyond the macula there were many fine striate lines radiating outwardly. The vision had increased to $5/30$ of normal, the pupil being fully and evenly dilated. The treatment pursued consisted of rest, iced compresses, atropin, and boric acid.

EDWARD A. SHUMWAY, Clerk.

CHICAGO OPHTHALMOLOGICAL SOCIETY.

Meeting of February 11, 1908. The President, Dr. Thomas A. Woodruff, in the Chair.

Symposium on Tuberculosis.

The Diagnosis of Extraocular Tuberculosis.

Dr. Charles Beard: Adenopathy is diagnostic in 80 per cent. of the cases; tuberculin is valuable only when tuberculosis elsewhere can be excluded; the ophthalmo-reaction of Calmette too often is of no value; tissue sections are unreliable; finding the tubercle bacillus and inoculation of animals are positive evidences of tuberculosis.

Diagnosis of Intraocular Tuberculosis.

Dr. Albert Bulson believes that many intractable cases of uveitis, heretofore not to be diagnosticated, will be found to be tuberculous. He also discussed the various forms of tuberculosis in the other intraocular structures.

Ophthalmo-reaction in Ocular Tuberculosis.

Dr. Frank E. Brawley reviewed the literature and reported his personal experiences with this diagnostic agent. He said that much work must still be done before the relation of the ophthalmo-reaction to general tuberculosis can be determined. The test seems to have a cumulative effect. He also mentioned the possibilities of harm.

Therapeutic Use of Tuberculin in Tuberculosis of Eye.

Dr. E. V. L. Brown described the von Hippel method of treatment.

Supplementary Report on a Case of Probable Cerebellar Tumor Treated by Tuberculin Injections.

Dr. H. B. Young stated that his patient first noted symp-

toms two years ago, and had been under treatment for one year. The disks are white and the vessels small. There is now no trace of the tremendous retinal involvement observed at first. The case is interesting because of the rapidity of the cure.

Dr. John C. Hollister said that surgeons have been endeavoring to determine the relative value of these various diagnostic procedures. Wolff-Eisner, who claims the so-called Calmette reaction as his own, says in the *Muenchner medizinische Wochenschrift*, January 14, 1908, that this should be called the conjunctival reaction. In manifest cases of tuberculosis, the method gives relatively frequent negative results. It is a method which is of value as an adjunct to clinical diagnosis. He advises the use of very dilute solutions, no stronger than 1:1,000,000, because too strong reactions are caused by stronger solutions. A one per cent. solution of Koch's old tuberculin in sterile physiologic salt solution is best. The glycerin makes no difference in the reaction. Calmette uses a one per cent. solution in a glycerin free preparation precipitated by alcohol.

Dr. Hollister mentioned 102 cases in which the skin test, the Wolff-Eisner test and the opsonic index were studied by Dr. Mary Lincoln, with the following results: Skin cases, total, 50; negative 11, positive 39, or 78 per cent., which compares favorably with von Pirquet's results. Wolff-Eisner test, 55 cases; negative 8, positive 47, or 85 per cent. Opsonic index, taking two or three out of four indices made on alternate days, if 2 are out of the normal index, between .8 and 1.2, there are 37 per cent, if one is out of the normal, there are 70 per cent. Of 32 non-tuberculous cases, the skin was positive in 3 and negative in 29, or 91 per cent. So far he has not found any cases that are not tuberculous that gave a reaction. Total 34 cases, all negative; opsonic index, 71 per cent. So that the eye reaction is more positive than either the von Pirquet or the opsonic index. Of 11 negative skin vaccinations, one gave a negative eye test, and two a very doubtful eye test. Of the eight negative eye tests, four of a series, one was a case of cured hip disease; one miliary tuberculosis; one, uncertain diagnosis, and one, unsatisfactory instillation. The amount

and quality of tuberculin used, the age of the patient and his resistance are factors to be considered. There are many different kinds of tuberculin of various strengths, and the product varies from bottle to bottle, and the individual bottle may vary at different times.

As to the eye reaction, German authors have divided it into reactions one, two and three; mild, strong and intense; others into mild and strong, according to the conjunctiva, the amount of injection, surface covered and subjective symptoms, such as feeling of sand in the eye, some itching and pain; pain back of the eye or radiating up toward the forehead, and lacrimation, nausea, vomiting and increased temperature, depending on the susceptibility of the patient and the dose given. A child reacts stronger than an adult, perhaps because of the fact that it has more lymphoid tissue in the conjunctiva. The time of the day when the test is made must also be considered. Of course, a clinical diagnosis of tuberculosis may be doubtful, unless the germs are found, even when histologic specimens are typical. The opsonic index entails a consideration of the leucocytes; what they are doing. Although it seems to be fairly reliable as to the patient's condition before anything is done, after the tuberculin has been given and the index has been changed, or the patient is inoculating himself, it is impossible to know what other reactions have taken place.

Dr. Thomas Faith cited a case of typical trachoma with a pannus and with enlargement of the preorbicular glands on the affected side which reacted to tuberculin, both general and locally. One case reported by Brunkiewicz in which tubercle was developing for several years, resulted in secondary glaucoma. Inoculation of the eye and specimens also showed tuberculosis.

He thought that the value of the various methods of diagnosis is open to question. Out of seven cases in which the ophthalmo-reaction was studied, five gave clinical evidences of tuberculosis, with tubercle bacilli in the sputum. In the remaining two cases the clinical evidences were suspicious, but in none was a reaction obtained by the ordinary methods suggested. In one of his own cases, a typical phlyctenule, with enlarged cervical glands, there was no reaction.

The belief at present, he said, is that phlyctenules are tuberculous in the majority of cases, but, then, not only the bacilli, but their toxins and other bacilli may cause tuberculosis and similar processes.

Dr. Wm. E. Gamble referred to a case he reported some years ago conjointly with Dr. Brown. The feature that was most prominent in that case was the harm that large therapeutic doses did, locally and generally, and the value of small doses. He suggested that track be kept of the patient's general condition during the treatment as an index of what is being accomplished. Wright, he said, in his last paper, mentioned that he had discovered that all of his injections were 1/10,000 mg. instead of 1/2,000. This mistake had been made by the manufacturer in putting up the container. So that this belief in the value of small doses is a general one. The Ehrlich side chain theory, if correct, explains this point very well. Wright treated an ulcer of the leg for a long time without any result. Later he injected locally around the ulcer, and it healed promptly. From that observation he draws the conclusion that there are parts of localized lowered resistance to the germs, and that by treating the particular part, he may get results, while if treating systematically he would fail. Dr. Gamble wondered whether some cases of ocular tuberculosis would not respond to treatment better if subconjunctival injections of small amounts of tuberculin were given. If tuberculin is good for anything it is for a local affection, and as more than 50 per cent. of the eye lesions are localized or latent in the eye, they are especially amenable to this treatment.

Dr. Wm. H. Wilder thought that these methods offered a means of differentiating some eye lesions heretofore classed as idiopathic, in which there is no well defined etiologic cause. But the question that concerns ophthalmologists most is, where is the lesion, and until this can be answered little will have been gained. Therefore, any test, to be of value must give a local as well as a general reaction. Then there is something definite to go on. In his experience with different tests, he has demanded such results, otherwise he felt that there was no positive evidence to show that the

lesion was ocular. It is well that many of these conditions classed by von Hippel as tubercular do not show the clinical features of tuberculo^sis. There are no tubercles in the iris or chorioid, but only a muddy vitreous, which is so dark that one can not get the red reflex, and it is impossible to make a diagnosis of tuberculo^sis. Probably, he said, some of the lesions the result of tuberculosis may be caused by toxins and not by the germ, such as some forms of serous iritis or cyclitis.

He has subjected a number of patients to the ophthalmoreaction recently, and in two there were evidences of distinct phlyctenular keratitis, with ciliary injection, photophobia and lacrimation, but the other eye was perfectly clear. Putting one drop of a one per cent. solution into the normal eye gave a pronounced reaction. In any case in the regressive stage one can get a very pronounced reaction by putting tuberculin into the unaffected eye. In both of these patients, children, there was a very marked lymphadenopathy. One child had a postcervical gland as large as a hazel nut. In this case there was a general as well as local reaction, and there was a distinct enlargement of the postcervical glands after the reaction; not so in the other case. He has used this method in three cases of phlyctenular keratitis with a positive reaction in two cases, and a negative reaction in one case, which raises the question whether these cases may not be tuberculous. He has long suspected this, but has been inclined to think that lymphadenopathy, more or less general, may exist without it being tuberculous, and that we might still have to use the term struma to explain these cases. If these cases of phlyctenular keratitis should prove to be tuberculous, one can hardly say that they are so histologically, and they have always been negative so far as the germ is concerned.

Dr. E. R. Lewis, Dubuque, Iowa, referred to autogenous vaccination. There exists in the serum of the blood, in the lymph, and in other body fluids, certain specific substances, opsonins, which enter into destructive chemical combination with invading germs, rendering these germs prey to the leucocytes; the immediate result of contact between germs and body fluids is to use up a part of the opsonic con-

tent of the body fluids; dead bacterial protoplasm, which tuberculin T. R., is, enters into chemical combination with opsonin in the same way that living bacterial protoplasm does, and uses up opsonins in direct proportion to the amount so brought in contact with the fluids; the effect of such opsonic depletion, whether by dead or by living bacterial protoplasm, provided it be not inordinate, is to stimulate new opsonin production in the tissues to such an extent that the opsonins which have been used up are more than replaced, and the body fluids are left richer in opsonins than they were before the depletion; inordinate depletions of the opsonic content of the body fluids, instead of bringing about reactionary production of new opsonins in excess of the depletion are followed by very inadequate replacement of the opsonins used up and leave the body fluid poorer in opsonins than they were before the depletion. The scientific application of vaccine therapy depends upon these five propositions. The good effects to be noted in the course of treatment along the lines laid down by Bier are to be laid at the door of autogenous vaccination; and it must be considered ill advised to inject tuberculin shortly after giving a patient treatment with the vacuum apparatus, for the reason just outlined. Similarly, exercise, hot fomentations, hot or cold baths, should not be allowed to precede immediately an injection of tuberculin. I believe that to the neglect of such precautions is to be attributed failure to get good results, or worse, the getting of bad results by tuberculin therapy. Careful reference to the index chart in each case must still be considered the safest guide to time and dosage for tuberculin. If we have not such chart for our guidance, careful attention and consideration must be given to everything of a nature to induce fortuitous vaccination.

Dr. Major H. Worthington reported 22 cases which he had observed in the service of Dr. Willis O. Nance at the Illinois Eye and Ear Infirmary, with a positive reaction in 14 and negative reaction in 8. In the latter the test was made two or more times at intervals of one to two days. The reaction was obtained in from three to twenty-four hours. In the first series of cases sterile water was used,

and in the others salt solution. In making the test, it seems necessary that the inflammatory condition be unilateral in order to avoid mistakes. In one case of very severe reaction, a general conjunctivitis was set up in twenty-four hours, and it persisted for ten days, showing the necessity of making a thorough examination of the eye before the test is made. The patient complained severely of diplopia, and also of partial loss of vision, found to be due to a refractive error.

Old tuberculin should not be used, and it is essential that great cleanliness be observed or the test will be of little value. In the case where the physical findings and clinical history were those of tuberculosis, the ophthalmo-reaction was positive. Of course, he said, this does not indicate that the tuberculous condition was in the eye only.

Dr. Henry Gradle said that in our knowledge of tuberculosis of the eye we can distinguish three stages. At first it was considered to be an exceedingly uncommon, exceptional occurrence. Then it was shown that half of them were typical masses in the external and internal parts of the eye, and we became conversant with actual tuberculosis of the conjunctiva, iris, sclera and uveal tract. But even then it was supposed that these lesions are not very frequent. Now, however, it has been shown that the eye is not nearly so exempt from tubercular involvement as we formerly considered it to be, only that many of the lesions are not typical, even in structure, and differ from tuberculosis elsewhere in the body in the tendency to healing.

It has been shown that various forms of scleritis and uveitis, even of comparatively benign nature, are due to tuberculosis, but it has likewise been strongly suggested that there are other eye affections of tubercular origin that are not due to the presence of the bacillus itself in the ocular tissues. The two affections he referred to particularly are some forms of iritis and phlyctenular conjunctivitis. Von Michel, more than anyone else, has claimed that iritis occurs more frequently in tuberculous individuals than in others, and tuberculosis of the lungs figures as a more predisposing cause than syphilis. Dr. Gradle's observations have not been tabulated sufficiently to come to conclusions, but he has gained the impression that iritis, when not re-

ferable to syphilis or other well recognizable etiologic factor, is often associated with tuberculosis in other parts of the body. Of course, the mere presence of tuberculosis elsewhere is not definite evidence that the iritis is of tuberculous origin, but the frequent coincidence makes such a supposition very probable.

Another form of iritis of tuberculous origin, which is a little more definite than the tuberculous variety, is phlyctenular keratitis and kerato-conjunctivitis. There is no reason to assume that the bacillus itself is present in the tissues; in fact, the clinical history of most of these cases in the earlier attacks, speaks against the existence of a bacillus in the eye, but not against toxins of transplanted dead bacilli, as some of Loebe's assistants have shown.

Dr. Gradle has found lymph nodes, presumably tuberculous, or those ordinarily termed scrofulous, almost invariably present, if sufficiently sought for; and hence the few instances in which these nodes are not palpable to the finger in the tissues of the neck are not exceptions to the rule. We must assume the existence of tuberculous focus elsewhere, probably in the bronchial lymph nodes. Also the clinical history and phlyctenular conjunctivitis agrees so fully with manifestations of scrofula in general, that the parallelism is strongly suggestive.

After tuberculin was introduced, Dr. Gradle tested four cases, all of which reacted generally, and one of them locally, as well. This latter patient did very poorly. There may have been actual tuberculosis of the cornea in that case. The other three cases apparently were benefited. Dr. Gradle's treatment of cases which he has been able to follow has since then been based on the assumption that conjunctivitis of phlyctenular variety is due to scrofula or tuberculosis of lymph nodes, and all general measures that can influence that condition favorably have seemed to possess a decided influence in preventing relapses of this condition.

One observation recently quoted in a German journal is of interest in connection with the ophthalmo-reaction, viz., that this reaction, if negative at the first trial, will prove positive in the same eye after about fourteen days, and even

in instances in which tuberculosis can not be demonstrated or even reasonably suspected. Evidently in these cases the tissues are hypersensitized so that a reaction will appear later. But such a reaction, in the same eye, does not indicate tuberculosis. It has also been shown that the eye which reacted not at all or very mildly, reacted without another instillation about a week or ten days later, when the old tuberculin was injected subcutaneously as a test, even when there was no general febrile condition produced, showing that hypersensitiveness of tissues can be produced merely by the presence of toxins placed artificially into the body without the existence of toxins in the body. A second test, therefore, made in the same eye after a lapse of days does not seem at present a clinical indication of actual tuberculosis.

Dr E. V. L. Brown referred to 22 cases studied in the Axenfeld clinic and reported in the *Klinische Monatsblätter*, January, 1908, in which both methods were tried. In nine the Calmette was positive, whereas the subcutaneous test was positive in all. So that the Calmette test is not so far reaching or reliable as the subcutaneous test.

Oversensitization is also discussed. The conclusions are in favor of the limitation of the Calmette reaction, and it probably has not a great place in ophthalmology. When used in the healthy eye, there is an absence of a local reaction when it is so absolutely essential to have this reaction. The test has no great significance in proving the presence of tuberculosis or syphilis which may co-exist.

Dr. Charles Beard stated that extraocular tuberculosis is unique in that it offers opportunity for the most positive and invaluable means of diagnosis. A piece of the tissue may be excised and studied in various ways in order to show the absence or presence of tuberculosis.

Dr. Albert Bulson, Jr., said that the more recent development of these methods will permit diagnosing some of the more obscure lesions of the eye, more so than has been possible heretofore, and that many of these lesions will be found to be tuberculous in character. Like all new methods, these must go through the stage of trial and experimentation before their definite value can be established. The

technic of these methods will be improved and with the increasing number of reports, definite conclusions will be possible. Personally he prefers to rely for diagnosis on the injection of tuberculin rather than on the ophthalmoreaction.

Meeting March 9, 1908.

Case of Suppuration of Right Temporal Region.

Dr. C. Gavin presented a case upon which he had successfully operated several weeks ago. Two weeks ago the patient returned with marked protrusion of the eyeball (left) and gave a history of suppuration from the left naris. Two incisions were made between the globe and the lower lid with the expectation of finding pus, but were negative. On the supposition that the suppuration originated in the left antrum, an opening was made through the upper second bicuspid. Much cheesy material was found in the antrum. A second opening was made through the nose to get drainage. Next, the patient developed an acute suppuration of the middle ear. The drum was incised and considerable pus evacuated, but the symptoms did not subside. The pain behind the ear increased, and radiated down toward the shoulder. A radical mastoid operation was done; the symptoms subsided, and a complete cure resulted. The pus was examined and only staphylococci were found.

Dr. A. H. Andrews was reminded of a case of orbital cellulitis, in which there was protrusion of the eye. A radical operation on the antrum relieved the condition entirely. An examination of the tissue showed carcinoma. The patient, a man, was only 31 years of age.

Chorioretinitis and Normal Vision.

Dr. Geo. F. Suker presented two cases. The first patient, a syphilitic, had chronic chorioretinitis of great extent, and yet vision under atropin is 20/20 in each eye. The chorioidal vessels are markedly sclerosed. The blood tension varied between 160-170.

A Case of Hemorrhagic Retinitis.

The second patient had a blind right eye. He had had a large retinal and a subhyaloid hemorrhage, with marked lesions in the retina. Repeated examinations of the urine failed to show albumin, until lately, when a very small percentage was found. Two weeks ago there occurred a hemorrhagic retinitis in the left eye, but not so severe as in the right. He considered it a typical case of granular kidney, and nephritis secondary to arteriosclerotic process.

Morax's Modification of Snodacker's Operation.

Dr. E. F. Snodacker described this operation.

Orbital Tumor.

Dr. Frank Allport presented a boy, aged 20, below par mentally, but physically well. February 4, 1908, there appeared a swelling at the inner angle of the right eye. A physician in Iowa made an incision, but only dark blood flowed from the wound. Moist compresses were applied, but the swelling grew larger. Another larger incision was made two weeks later, but only blood flowed in large quantity. The swelling rapidly increased in size. The patient's personal history is negative. The accessory sinuses were all gone over carefully; there was no ear trouble; mouth, throat and nose were healthy. He thought that it was either a rapidly growing sarcoma, or a thrombosis of the cavernous sinus, but the symptoms manifested were not typical of either condition yet partaking of both.

Dr. Wm. H. Wilder thought the theory of a rapidly growing neoplasm was more plausible than that it was an affection of the cavernous sinus, inasmuch as there were no symptoms of exophthalmos. Relief has been afforded in such cases by ligation of the internal carotid artery, although the condition, he thought, was sufficiently grave to warrant an exenteration.

Sympathetic Iritis.

Dr. H. B. Young reported the case of a young man who, following a gonococcus infection, developed a staphyloma

in the left eye, which was abscised. Later he had pain in the right eye, which subsided after a few days. The iris gradually changed to a dirty gray color. Examination showed a dark brown exudate behind iris above pupillary space, which gradually spread downward. The left eye was enucleated, but the process in the right eye continued until the pupillary area was entirely covered. The iris was like a dirty curtain. There was no pain. Vision finally increased in the right eye. A paracentesis was done, but was not satisfactory, and an attempt to cut the iris at its anterior border failed. Within 48 hours, however, the tension receded and since then had given no trouble. The patient has good perception of light and projection in all directions, and has some faint sense of objects. The question, he said, is: What should be done to give better sight, and when?

The iris is probably tied down to the lens above, and the cornea below, and the probabilities are that any attempt to increase vision would include removal of the lens. The only feasible operation, he thought, was corneal section, removal of the lens and as much of the iris as possible. The condition is probably a sympathetic iritis and not a pure iridocyclitis.

Dr. Geo. F. Suker thought that there was an iridocyclitis, as there could not be such marked involvement of the iris without some involvement of the ciliary body. He thought that Dr. Young was justified in attempting to clear the cornea as much as possible, and to do later an iridectomy with extraction of the lens. Cocainize the cornea and flush the eye with as hot a solution of normal salt as the patient can stand, using about a pint at each irrigation, once or twice a day, or oftener. Subconjunctival injections of dionin or hypodermic injections might prove useful.

Dr. Oscar Dodd also believed that there is always a severe cyclitis in these cases, in spite of the location of the tenderness and the minus tension. He thought that in these cases atropin is extremely useful, in the form of an ointment containing four per cent. of atropin and ten per cent. of cocain. It will quiet the tension better than anything else. The reason is that it lessens secretion from the ciliary body and also lessens the pain.

As regards the time for doing an operation, he advised waiting as long as the condition of the eye is improving under treatment. The salicylates have some value in these cases, subconjunctival injections some, dionin a little, but these things must be varied in order to accomplish something.

As far as results are concerned, it is necessary to remove as large a piece of the capsule and iris as possible, wash out the lens, and later do an iridectomy. As long as the tension is keeping near normal and the congestion is lessening, it is well to wait for months before attempting to do anything more.

Dr. Young stated that a two per cent. atropin ointment was being used and that a true plastic cyclitis, with the formation of new tissue was not present, so that whatever condition affected the ciliary body was a secondary affair. It was not a true iridocyclitis.

Papilloma of Conjunctiva.

Dr. Thomas Faith reported the case of a man, aged 28, with good family and personal history, who had been treated for trachoma and was operated on a number of times by other oculists. When he first saw the patient, the right upper lid was covered by a fleshy tumor, resembling an exaggerated granular conjunctivitis, which on section proved to be a papilloma. The patient was treated with the x-ray, and after four months the growth had disappeared and it has not returned after three years.

Dr. E. F. Snyder recently saw a case of a large sessile growth growing from the inner portion of the cartilage of the right eye, pink in color and raised about 2 mm. from the surface. It had been there for several months, not increasing in size and giving the sensation of a foreign body in the eye. The tumor with the cartilage was removed and has not recurred. Clinically the tumor resembled a papilloma. The pathologic report shows a papilloma.

Etiologic Significance of Angiosclerosis in Certain Type of Fundus Lesion and Cataract.

Dr. George F. Suker stated that arteriosclerosis and age are no longer synonymous conditions because the former oc-

curs in the young as well as in the old. Any acute infectious disease may leave its imprint on the blood vessels and eventually when given proper impetus terminate in arteriosclerosis either local or general. Ordinary senile cataract is an expression of arteriosclerosis, the result of malnutrition and local autointoxication. Opacities begin in the lower part of the lens, probably the result of gravity, and disseminate from below upwards. In glaucoma, the arteriosclerotic process goes on in the posterior part of the globe, with marked changes even in the ophthalmic and retinal arteries.

Retinitis albuminurica unaccompanied by any active inflammatory reactions in the retina or chorioid occurs more often with the granular kidney, the latter frequently being a sequence of the arteriosclerosis, whereas the parenchymatous nephritis is not, and the retinitis is frequently of an intense inflammatory character. More often acute retinal and chorioidal inflammations, optic neuritis and choked disk are seen in parenchymatous than in interstitial nephritis, though the latter is by all odds the more common clinical manifestation. The reason he assigns for this is that in the granular kidney the urinary secretions are more copious, less excessive increased blood tension nor as great a toxic circulating element as in the parenchymatous nephritis.

Penetrating Wound in Both Eyes Identical in Character.

Dr. Paul Guilford reported the case of a man, aged 23. While winding wire on a wheel, the wire broke and struck him in the left eye, penetrating the center of the cornea and lacerating the anterior capsule of the lens. Under appropriate treatment the symptoms subsided, but later a cataract operation was necessitated by a partial absorption of the lens. Three years afterward precisely, the same accident occurred, the wire striking the right eye, causing a traumatic cataract, which was treated as before. In neither instance was the iris injured, nor was there serious disturbance of the vitreous or fundus, and in both eyes there was a small central corneal opacity which interfered to some extent with vision.

Dr. Oscar Dodd stated that Dr. Bruns, of New Orleans, has been in the habit of filling the conjunctival sac with argyrol solution after cataract operations with exceptionally good results.

Dr. Frank Allport has used argyrol for years in all his cataract operations. The eye is first thoroughly cleaned and before making an incision, a 25 per cent. argyrol solution is instilled over the cornea, and when the operation is completed a drop or two of argyrol solution is placed directly over the incision. In severe cases of injury of the eyeball, and in apparently hopeless cases, he fills the eye with argyrol, with excellent result, frequently saving an eyeball that appeared to be beyond saving. He has not had a case of staining from its use.

A Patient Who Had Suffered Seven Attacks of Iritis in Ten Years.

Dr. Willis O. Nance exhibited a patient 26 years old who had an attack of recurrent iritis. The interesting feature in this case was that the patient has suffered from seven attacks of iritis in ten years. His family history was good, except that his mother had had sore eyes during her pregnancy. Personal history was negative, except for an attack of rheumatism three years after the first attack of iritis. There is no evidence of tuberculosis. Calmette and subcutaneous tuberculin tests were negative. During each attack the patient had received inunctions, and the trouble promptly disappeared. Patient had declined to continue protracted mercurial treatment.

A Case of Parinaud's Conjunctivitis.

Dr. W. H. Wilder exhibited a patient who presented symptoms of this form of conjunctivitis.

Dr. E. V. L. Brown thought that the possibility of tuberculosis must be considered in this case, and that some of the spots suggested it. He suggested trying the von Pirquet skin reaction in the case.

Dr. E. F. Snyder reported a case almost identical with Dr. Wilder's occurring in a boy, aged 4 years. The conjunctiva was covered with granulations and there was a slight corneal involvement. The glands did not break down. Smears showed the tubercle bacillus.

Dr. Thomas Faith asked whether it is the rule for the

glands to become enlarged before the onset of the conjunctival disease.

Meeting of April 13th, 1908, at the Illinois Charitable Eye and Ear Infirmary. Dr. T. A. Woodruff presiding.

A Case of Cicatricial Ectropion and Ptosis Relieved by Operation.

Dr. Charles H. Beard exhibited a girl, 20 years old, who had, since childhood, had exaggerated ectropion of the right lower lid from some form of ulceration of the skin beneath the eye that, judging from the scar, seems to have been a blastomycosis. There had been a previous attempt to correct the deformity. About one year ago she was admitted to the Infirmary and submitted to a plastic operation which has resulted in perfect replacement of the lid. The operation consisted in making an incision parallel with and about 3 mm. from the free border of the lid, and extending beyond the canthi, dissecting beneath, and loosening freely the everted lid, so that it could be turned up over the upper lid, with the cilia in contact with the super-cilia. This left a very large elliptical defect, to cover which Dr. Beard took from the inner side of the upper left arm an enormous Wolff graft measuring 4 by 3 inches. The arm defect was so expansive that notwithstanding extensive undermining of the surrounding skin, and the making of bracket incisions, the wound could be only partially closed, so that Thiersch grafts were put on, after granulation had occurred. The Wolff graft was lightly stitched to the skin around, the upper thread ends being left long, and fastened to the brow by colodionized gauze. The patient was discharged with perfect replacement, early in the summer of last year.

She returned to the hospital this past winter with an epiphora of the same eye that was remarkable for its copiousness, and, in consequence, a slight mucous ectropion of the lower lid. To relieve the conditions the orbital lacrimal gland was removed. This proved to be of unusual size. The palpebral portion of the gland was spared. The mucous ectropion promptly disappeared. Notwithstanding the fact

that the branch of the third nerve supplying the levator is, normally, far removed from what was the field of operation in this instance, there followed complete ptosis, which remained so long without any signs of improvement that a ptosis operation was decided upon. Dr. Beard can account for injury to the third nerve only by supposing an anomalous distribution of the levator branch. The Motais measure was chosen. It is now about one month since the operation was made, and the result is most satisfactory. The lid is not only sufficiently elevated, but goes up further with upward movements of the globe.

A Case of Argyrosis.

Dr. Willis O. Nance exhibited a case of decided argyrosis in a woman of 40. The bulbar conjunctivae of both eyes were stained a dirty black, so that no white sclera could be seen through the normal palpebral fissures. The conjunctival surface from the inner corneoscleral aspect to the inner canthi, including both caruncles, were stained a jet black. The palpebral conjunctivae were also deeply stained. The history of the case is obscure. The patient is a Russian Jewess, who six years ago suffered an attack of small-pox in her native land. The eyes were affected and a physician gave her some drops to use. She dropped the medicine (undoubtedly a solution of nitrate of silver) in her eyes three times a day for more than four weeks. She has a typical cicatricial trachoma. Six months ago she came under the care of Dr. Lebensohn, who states that the stains have decreased nearly one-fourth in intensity since she came under his observation. He has been employing dionin.

Mules' Operation.

Dr. Nance also exhibited a boy of 13 upon whom an evisceration of the right eye had been done ten days ago, and a glass-ball inserted in Tenon's capsule, according to the method of Mr. Mules. The boy, while playing in the street, had run against a spike in a telephone-pole, sustaining a wide and deep perforating wound of the eyeball. A rather marked reaction had followed the operation, with consider-

able swelling of the side of the face, but practically all had now subsided, the wound appeared smooth, with every indication of the glass ball remaining. The operation was performed by Dr. Swift, the house surgeon in Dr. Nance's service at the Infirmary. Dr. Nance also reported a case of successful Mules' implantation which he had done nine months ago. He believes that in cases where the ball works out of the socket, in most instances the ball implanted is too large.

Ophthalmia Neonatorum Treated by Copious Irrigations.

Dr. Nance reported favorable results in the treatment of purulent conjunctivitis of gonococcic origin of the new-born in a series of four cases at the Infirmary under his own service and that of Dr. E. V. L. Brown. The method employed was that of Kalt, which consists of irrigating the conjunctival sacs three times a day with two litres of a 1/15,000 solution of permanganate of potash. A fountain syringe and a specially prepared glass tip, made absolutely smooth, are used. The container of the syringe is placed not more than two feet above the patient's head. The infant is held on its back during the irrigation. No other treatment was employed in the cases reported.

A Case of Gonorrheal Conjunctivitis and Specific Vaginitis in a Girl of Nine Years.

Dr. Nance exhibited a little girl who was sent to the Infirmary from a public institution for children three weeks ago. She suffered from a virulent purulent conjunctivitis with extensive corneal involvement. The presence of gonococci was demonstrated both in the eye and the vagina. The conjunctival disease cleared up under frequent boracic irrigations and the use of strong argentic nitrat applications. The cornea presents a circumscribed opacity involving the lower third.

Hemorrhage Into Anterior Chamber Following Cataract Extraction.

Dr. W. H. Wilder reported a case of hemorrhage in the anterior chamber four days after cataract extraction. The

anterior chamber was almost filled with blood; there were repeated hemorrhages. The urine and blood pressure tests were negative. The hemorrhage gradually cleared up.

Hyaline Degeneration of Conjunctiva.

Dr. Wilder also reported on case shown before the Society at a former meeting. The entire conjunctival sac was atrophied.

Symblepharon.

Dr. Wilder exhibited a boy on whom he had operated for symblepharon by the aid of a Thiersch graft on a metal plate.

Leucomata from Corneal Ulcers.

Dr. Wilder presented a man who had suffered from ser-piginous ulcers of both corneae. He called attention to the efficiency of cauterization and paracentesis of the anterior chamber in the treatment of ulcers of the cornea.

Dr. E. V. L. Brown showed two cases of keratitis disciformis, one in a man who had had a small corneal ulcer, caused by the Morax-Axenfeld diplobacillus, and the other in a boy with the stigmata of inherited syphilis, but no local cause; extensive posterior synechia was present in the boy.

Both cases showed or had shown the typical central infiltrate with sharply demarcated outer borders and two or three complete or incomplete concentric rings or arcs of infiltrate, along with deep radial bands of opacity.

The only complete anatomical study of a case of this interesting form of interstitial keratitis has been made by Meller, who found an anterior and a posterior deep infiltration ring complicated by an anterior uveitis, which he believes to be only an attendant finding.

Interstitial Keratitis.

Dr. H. B. Young presented a case of interstitial keratitis as a possible illustration of the traumatic factor in the etiology. The patient was a man of 30 years who six weeks

ago had an abrasion of the cornea from a small foreign body which he said was removed by a fellow-workman on the day he got it. Two days later when he presented himself for treatment a small depression could still be seen. He has had no rheumatism, etc., but the teeth are suggestive of inherited disease.

MORTIMER FRANK, Secretary.

COLORADO OPHTHALMOLOGICAL SOCIETY.

Meeting of February 15, 1908, in Denver. Dr. David B. Strickler, presiding.

Secondary Glaucoma.

Dr. David H. Coover presented a man, aged fifty, who consulted him on the second of last January, stating that about a month previous he had first noticed blindness of the right eye. A few weeks before this he had no difficulty in sighting accurately with this eye, in shooting.

At the time of discovering the blindness the family physician treated this patient for "pink eye." A thick pterygium lent color to this diagnosis.

Dr. Coover found the iris discolored, pupil bound down, ciliary injection, normal tension, vision = light perception, fundus details invisible on account of cloudy media. Pain in and around the eye at night only. Atropin and "mixed treatment" were ordered. Returning home the pain increased, attacks coming on every three or four days. Pilocarpin and large doses of sodium salicylate gave no relief.

He returned to Dr. Coover February 4th, with tension plus one, the upper half of the pupil dilated, the lower half adherent, vision = light perception, cornea steamy and anesthetic, and with two new-formed, tortuous blood vessels visible on the iris. Severe pain was relieved by hot applications, but increased by either eserine or pilocarpin. The tension varied day by day from normal to plus, and occasionally tremulousness of the non-adherent portion of the iris and bulging of the nasal portion was observed. Transillumination failed in the region of the pterygium. Dr. Coover asked for suggestions as to diagnosis and treatment.

Discussion.—Dr. Stevens had seen this case in consultation with Dr. Coover, and considered the condition very obscure; but was inclined to believe in the presence of a tumor at the base of the iris or anterior part of the ciliary body, or glaucoma secondary to intra-ocular hemorrhage. He also noted marked arteriosclerosis.

Dr. Jackson was divided in opinion between a neoplasm and vascular disease, with possibly hemorrhage in the ciliary region. The blood vessels and tissues of the iris were rigid, as shown by the pupil not contracting after withdrawal of the mydriatic used.

Drs. Davis and Libby thought the new-formed vessels suggested a new growth. Dr. Bane would apply adrenalin to the pterygium, and then try transillumination again. In general, he would enucleate such an eye. Others present believed this to be the best procedure in this case. Drs. Walker and Neeper would perform iridectomy. To this Dr. Coover urged the probability of severe bleeding.

Drs. Ringle and Patterson considered a new growth probable, the latter believing it to be malignant.

NOTE.—Dr. Coover subsequently reported enucleation of this eye. Macroscopic examination by Dr. F. A. Lane, Chicago, revealed epibulbar tumefaction of inner limbus corneae; iritis plastica, with almost complete pupillary synechia; cataracta acreta; no evidence whatever of intra-ocular growth; excavation of optic disk; extensive hemorrhagic retinitis; a few vitreous opacities.

Atypical Cataract.

A woman of about fifty, who caned chairs, was also shown by Dr. Coover. Her right eye had been operated for cataract twelve years before; the iris having so caught in the corneal incision as to displace the pupils upwards as far as possible. A dense membrane covering this pupil showed a minute central opening through which vision = fingers. The left eye showed a very thin cataract, through the center of which a faint fundus reflex was observable. Vision = perception and projection of light. The pupil dilated well except for slight synechia below.

Discussion.—(Left eye) Dr. Jackson believed there was tough, hard lens matter to depth of 1 to 2 mm. Some of this cortex he would extract; being afraid that free needling would give a dangerous reaction. He regarded radiation on opaque material as indicative of lens cortex.

Dr. Davis thought the absence of tremulousness of the iris indicated the presence of lens cortex.

Dr. Hess would do iridectomy, and extract the lens and tough capsule. Dr. Sisson suggested needling; while Drs. Bane and Libby would extract in capsule.

Dr. Ringle advised a preliminary needling. If there was no undue reaction he would also needle later, using two needles.

Dr. Walker considered simple extraction to be the operation of choice. Dr. Coover said, in closing, that he would advise iridectomy, extraction of cortex, and cutting of capsule with the DeWecker scissors.

Pemphigus.

Dr. W. C. Bane showed the case of entropion presented by him at the January meeting. He had since evacuated a drop of pus from the chalazion.

Discussion.—Members who had seen this patient previously believed there had been an increase in the contraction of the conjunctiva of the lower cul-de-sac.

Drs. Jackson and Walker concurred in the diagnosis of pemphigus; and had seen the blebs of this disease, in the nose, when absent from the eye. Dr. Neeper advised the use of dionin.

CASES REPORTED.

Miotics.

Dr. E. R. Conant had recently seen headaches that came on at night, or were worse then, helped by nightly instillation of $1/2$ per cent. eserine salicylate for a few weeks, in several cases between 34 and 50 years of age.

Dr. Stevens spoke of the good effect of eserine while first getting accustomed to glasses that are not well borne.

Dr. Jackson mentioned Dr. John Green's practice of using at night $1/5$ to $2/5$ per cent. pilocarpin for asthenopia not relieved by glasses.

Dr. Coover reported typical acute glaucoma in a man of 65 following the use of $2/5$ per cent. atropin by the family practitioner in a case of probable chronic glaucoma. Prompt double iridectomy gave relief.

Trachoma.

Dr. W. A. Sedwick had recently observed improvement of vision in a case of trachoma, from counting fingers to 20/30 partly, from energetic scouring of the lid with boric acid crystals. He also used 20 per cent. argyrol applications.

Dr. Coover had lately found sterilized sandpaper effective in the papillary form of trachoma. It produced a smoother surface than gauze and boric acid with less reaction.

Acute Conjunctivitis.

Dr. Bane stated that boric acid powder placed in the conjunctival sacs would cut short acute conjunctivitis.

Dr. Ringle had found one application of adrenalin and cocain, followed by one of 10 to 20 per cent. argyrol, aborted acute conjunctivitis, frequently.

Ocular Effects of Erysipelas.

Dr. Coover reported facial and ocular infection from erysipelas in the nostril of the same side, in an adult. The conjunctiva of the lower lid was a dirty gray, both lids were swollen, and there was a muco-purulent discharge. Convalescence occurred after three weeks. He also reported a woman, aged 82, suffering from erysipelas, in whom the affected eye burst and shrunk; and a man whose eye was destroyed by erysipelas from an infected wound above that organ. He had noted the trivial pain, contrary to panophthalmitis generally.

Dr. Strickler reported loss of vision and hearing power in a few days after erysipelas, in a man of 60. Death occurred in one week.

Dr. Stevens mentioned a case of blindness, without pain, following erysipelas.

Dr. Jackson spoke of a case of non-septic thrombosis of the cavernous sinus, which crossed from the right side of the nose to behind the left eye, causing proptosis.

Scarlet Fever Keratitis.

Dr. Bane had recently observed mild binocular inflammation in this disease in a child of 2 months, one day;

followed the next, by rapid softening and destruction of the cornea of one eye. Streptococci were found in the nose and in the eye.

Influenzal Panophthalmitis.

Dr. Jackson reported panophthalmitis following influenza. Tension plus 2, and rapidly increasing exophthalmos. In two or three days pus appeared in the anterior chamber. The cornea burst. The pus showed bacillus of influenza. Later, the patient died of pericarditis.

Mooren's Ulcer of the Cornea.

Dr. E. W. Stevens reported a case of Mooren's ulcer. The patient, a woman aged 72 years, came under observation July 10, 1907, with the following history: On July 1st her right eye became primarily inflamed. She had treated the eye herself with boric wash and had worn colored glasses.

On examination a non-purulent, clear shallow ulcer was seen near the upper corneal margin of the right eye. The ulcer was crescentic in shape, with one edge undermined so as to form a flap two mm. wide; under the flap was a line of infiltration of a dull white color. A small part of the ulcer behind the cleft edge stained with fluorescein. The ulcer was anesthetic. Applications of tincture of iodine, carbolic acid and nitric acid during the ensuing weeks were made without the use of cocaine, and produced little or no discomfort. There was very little redness of the eyeball at the first examination. Later, a well-defined pericorneal zone and vascularization of the base of the ulcer developed.

The corneal epithelium surrounding the ulcer, excepting that portion covering the overhanging flap, was loosely adherent, and could be easily pushed aside with a cotton-covered probe. It quickly reformed. There was no hypopyon nor iritis. The treatment adopted was clipping away the overhanging edge of the ulcer with scissors and curetting with a spud the thin layer of infiltrated tissue. The whole surface was then touched with tincture

of iodine. Atropin was instilled and a bandage applied. The patient was directed to bathe the eye with hot water for twenty minutes three times daily, and a boric wash was ordered.

For the next two months the ulcer was treated at regular intervals, being curetted and cauterized many times with various agents, as carbolic acid, tincture of iodine, etc. At times the disease seemed to be under control; but it proved to be only short intervals of rest, to be followed by a further advance, beginning in the line where the undermined edge had been destroyed.

Dr. E. Jackson saw the case in consultation when the ulcer had been under treatment for eight weeks, and at his suggestion nitric acid was applied.

During the following month the ulcer was cauterized at intervals with this agent. The patient was discharged after having been under treatment for fourteen weeks. The upper half of the cornea was leucomatous; but this condition greatly improved during the following four months.

The diagnosis of Mooren's ulcer will always be clouded by doubt during the early stages, or when the ulcer heals with a few weeks' treatment.

The diagnosis seems justifiable in this case for the following reasons:

(1) It was a chronic non-purulent ulcer belonging to the marginal group.

(2) It presented the peculiar undermined advancing edge, forming a narrow sinuous whitish band level with the cornea beyond, described by Nettleship.

(3) The anesthesia of the cornea behind the advancing margin of the ulcer.

(4) The absence of purulent infiltration.

(5) Its chronicity and intractable nature.

Dr. Edward Jackson reported the following case of Mooren's ulcer: A man, aged 64, carpenter, and otherwise healthy, came for inflammation of the left eye. Two years before he had a similar attack in the right eye, lasting several weeks, and leaving a small macula in the upper third of the cornea. This eye now had vision of 4/6 with lens.

The attack in the left eye had begun eight weeks previously; the lower two-thirds of the cornea was involved, the opacity covering the undilated pupil. At the temporal side it was vascular, and along the limbus to the nasal side an area of nearly one-fourth of the cornea stained with fluorescein. The ulceration was superficial, and to the lower and nasal sides overlapped by a thin layer of tissue, chiefly epithelium and vessels, which showed no tendency to adhere to the ulcer. The edges of the ulcer were cauterized with nitric acid. This caused pain lasting six or eight hours; but next day the eye was more comfortable than before the application. It improved for two days, then became painful, and the whole surface was cauterized with nitric acid. In eighteen days the acid was applied five times. After each application there was marked narrowing of the ulcer, and three days after the last application the ulcer had healed.

Vision had fallen to counting fingers at four feet; but three weeks after the healing of the ulcer, had risen to 4/25 with pupil undilated.

Meeting of March 21, 1908, in Denver. Dr. William C. Bane, presiding.

Dislocated Lens in Anterior Chamber.

Dr. G. F. Libby presented a man of 22, with a transparent lens dislocated into the lower part of the anterior chamber, following by many months a perforating wound of the lower lid and eyeball, with multiple lacerations of the iris, which was displaced and adherent.

There was a corneal ectasia about 1 mm. in diameter at the lower corneoscleral limbus, showing the seat of the perforation of 11/2 years before.

The patient had pulled the steel splinter out through the skin of the lower lid, half an hour after accident. It was from the cutting edge of a cold chisel, and measured 24 x 4 x 1.5 mm., with sharp points. R. V. = 1/10 on March 3, 1908, when he presented himself for examination and treatment for pain that had first appeared one month before, and still persisted.

Tension was normal, but the eye was moderately injected and irritable. Extraction of the dislocated lens was advised, but not consented to by the patient. Atropin, hot applications and dionin were applied with benefit for eighteen days, when the case was presented to the Society.

Discussion.—Drs. Davis, Neeper and Sisson thought extraction feasible. Dr. Coover suggested the continuance of dionin in the hope of absorbing the lens. Extraction through a low peripheral incision was deemed by Dr. Jackson to be the only operation, although the eye might be worse afterwards. He had seen this case eleven days before; and thought the lens seemed to be contracting. Dr. Stickler would continue the dionin, hoping for absorption; and would not operate unless the pain persisted.

Dr. Strader, who saw this case within twenty-four hours after the accident, then noted a prolapse of the iris, which increased in the following ten days, but no dislocation of the lens.

Dr. Black saw the patient about ten months after the accident, when the lens was not noticeably dislocated. He believed the lens was now subnormal in size; but with Dr. Bane, could not see how dionin would affect absorption. Dr. Bane tested with the sideroscope for steel within the eye. Result negative.

NOTE.—Two weeks later the eye was free from pain and irritability, under continuance of atropin, heat and dionin (increased from $2\frac{1}{2}$ per cent. once daily to 5 per cent. twice a day), and the lens had further shrunken one-half to two-thirds.

Ophthalmoscopy of Frogs' Eyes.

Dr. A. C. Magruder presented two live frogs, the ophthalmoscopic examination of whose eyes clearly showed the movement of the blood corpuscles in the arterial, capillary and venous circulation of the retina. The arteries were smaller and of lighter tint than the veins, the capillaries were decidedly whitish, and the fundus was pale; but the disk was plainer to the imagination than to the eye of the observer.

It was a novel and most interesting demonstration.

Symblepharon.

Dr. G. H. Strader reported dissection of symblepharon bands and the placing of a Thiersch graft to prevent the re-formation of the adhesions, with success for a time, but final obliteration of the sac.

Discussion.—Dr. Coover used a Fox conformer, and Dr. Bane a lead foil for four or five days, to prevent re-attachment of the adhesions.

Dr. Neepor related a case involving the conjunctiva and upper third of the cornea, in which a paraffin plate worked successfully after operation.

Glaucoma with Vomiting.

Dr. F. R. Spencer reported a case of glaucoma, in a miner 66 years of age, in which nausea and vomiting were very marked symptoms. The patient was first seen about February 1, 1908, by Dr. G. H. Cattermole, who was called to treat him for the nausea and vomiting. A thorough examination failed to reveal any abdominal symptoms to account for his condition.

Dr. Cattermole found a slight peri-corneal injection of the left eye, with elevation of tension and cataractous lens. The patient at this time complained of pain in the left temporo-orbital region.

Dr. Spencer was called in consultation, February 5, and found a slight peri-corneal injection of the sclera; tension about plus 2, complete cataract, dilated pupil which did not react well to light, and a hazy cornea and aqueous.

The patient stated that he had experienced three or four similar attacks during the past twelve years, and that the vision of the left eye had gradually failed. As the light perception was questionable and the patient's suffering was very great, an iridectomy or posterior sclerotomy was deemed inadvisable, but enucleation was advised. The eye was enucleated under general anesthesia, February 8th.

The report from the pathological laboratory of the University of Colorado showed chronic non-inflammatory glaucoma with marked stretching of the sclera. There were no signs of malignancy.

The interesting features of this case were the persistent nausea and vomiting, which resisted medication, and the complete absence of any sign of glaucoma in the other eye. DeSchweinitz mentions nausea and vomiting in connection with glaucoma and the cataractous change secondary to this disease. He also mentions the fact that the other eye is not so likely to be involved in case cataract accompanies glaucoma.

Six weeks later the patient was enjoying the best of health and stated that he was better than for over two years.

Secondary Cataract Knife.

Dr. Melvin Black reported a cataract operation showing the value of his secondary cataract knife. The eye was so deep-seated that it became necessary to rotate it nasally in order to make counter-puncture. On rotating the eye back, the aqueous escaped and the iris folded over the knife so as to prevent completion of the section without excising the iris; which accident was overcome by replacing the Graefe with the secondary knife. He also reported cataract operation for a lens, which had been opaque fifteen years. Capsulotomy was followed by a gush of milky fluid, but neither cortex nor nucleus was found. The capsule was extracted.

GEORGE F. LIBBY,
Secretary.

OPHTHALMIC SECTION, ST. LOUIS MEDICAL
SOCIETY.

Meeting of December 11, 1907.

A Case in Which, to Cure a Lacrimal Abscess, it Became Necessary to Make a False Passage (Patient).—Dr. W. H. LUEDDE.

Three years ago this man was struck on the nose with a baseball bat. The compound fracture of the bones was dressed by a physician. Five days later the sutures were removed. There has been some discharge of pus ever since. He has received no treatment during this time. There was a small sinus at the right side of the nose from which pus discharged. Considerable swelling of lower eyelid and cheek at inner end. I passed a No. 4 Bowman probe to the upper end of the lacrimal canal by the upper canaliculus. Pressure on the probe caused a flow of thick pus from the sinus. I injected a 1/5 per cent. silver nitrate solution, washing out the abscess cavity freely, and continued to wash it every second day. Trial with Nos. 4 and 6 probes showed no communication between the upper end of the lacrimal canal and the nose. On the ninth day, because the fistulous opening was becoming obstructed, there was a slight extravasation under the skin. Following this extravasation I continued to use only a normal saline solution, simply to know that the abscess cavity was being emptied. The tenderness ceased very quickly and the swelling went down so rapidly that it looked as if I had used some special remedial agent. The fistula opening closed five days later, and the discharge became much less. There was no longer a purulent secretion. It consisted of a quantity of glairy mucus. I continued the injections of normal saline solution into the cavity, the return flow being by the lower punctum.

Attempts to pass probes to the nose were unsuccessful. I then sent the patient to Dr. Sluder for a nasal examination, who found a very large, overhanging, hypertrophied turbinate. After he had shrunk the turbinates I attempted

again to pass the probes and was at last able to do so by raising the tip slightly, and passing it forward. A copious epistaxis showed that it had passed into the nose. This was a No. 1 Bowman probe. I could not pass the No. 2 probe. Two days later the injections employed trickled into the nose so that the patient could taste the solutions. I have continued probing at intervals of a week, using the Nos. 4, 5 and 6 Bowman probes, and during one interval of two weeks the canal has remained perfectly open, solutions injected by upper punctum passing in a stream to nose before probe was passed. I think that in this case there is a false passage which was the only available passage under the circumstances. There was a mechanical obstruction, the result of trauma. Natural relations were disturbed. The treatment was simply mechanical. I do not think much importance attaches to the solutions used. A question that might come up is, what to do with this depression at the sinus. After the first week, when there seemed no chance of going through to the nose, I advised him to have the lacrimal gland removed, but he was unwilling, and I did not insist. I shall feel more inclined toward this conservative line of treatment in the future, as the result in this case has been so satisfactory.

Discussion.—Dr. J. Ellis Jennings said that the practical question was how long would the passage remain open. He had treated many lacrimal cases, and had found that in the presence of a bony stricture it was almost impossible to keep the duct open, and treatment was very unsatisfactory. The quickest method would be the removal of the lacrimal sac. Unless probed every ten days it would not stay open very long.

Dr. Green stated that possibly the introduction of a gold style might be of assistance in this case. In a case of simple stricture of the duct, he had made a little impression by probes alone, but a permanent opening was effected by the use of a lead and then of a gold style, as suggested by Weeks. One question that this case brought up was in regard to the danger of such a puncture through an infected sac leading to nasal or even orbital infection. Pos-

sibly the injection of paraffin might remedy the depression in the cheek.

Dr. Barck did not believe this opening would remain open unless the probing was continued indefinitely. Furthermore, he considered it dangerous to go through the bone so near the ethmoidal cells. The infectious material might be carried into the maxillary sinus. As to the use of the styles, they should be put in only far enough to permit touching the upper end. To heal in little canulas of gold was quite the fashion in the seventeenth century, and the French surgeon, Dupuytren, stated that he had had to remove some half hundred of them, because they made inflammatory symptoms afterwards. While many cases could be cured without the removal of the lacrimal sac, in others it was absolutely impossible to give relief without such a procedure. He could understand the statement made by Dr. Theobald, of Baltimore, in his textbook, that he found it never necessary to extirpate a lacrimal sac. But to say that extirpation of the lacrimal sac in every case was necessary, was going too far.

Dr. Luedde believed that some of these cases got well and remained well. He felt he would rather take chances on a constriction in a bony canal that remained open two weeks at a time, than he would with obstruction in a canal in soft tissues. This opening being through the wall of the bony canal did not jeopardize the ultimate successful issue. If this opening into the nose had been above the inferior turbinate there might have been danger of infection of the antrum or accessory sinuses, but the opening was below and not above the inferior turbinate, and there was no reason to anticipate trouble from these sources. The passage was not made until every other attempt to pass the probe had been a failure.

**Degeneration of the Chorioid (Patient).—Dr. E. H
HIGBEE, JR.**

This is a case of degeneration of the chorioid that is rather remarkable in its extent. There is scarcely any of the chorioid that has not been inflamed and degenerated, yet the chorioidal vessels, especially the layer of larger ves-

sels, are very plain and do not seem to have undergone any particular change, ophthalmoscopically. There is secondary atrophy, following a neuritis; this atrophy seems to be stationary now, as he has had about the same acuity of vision for the past year. The condition is of syphilitic origin, and I show the case because of the amount of destruction of the chorioid, and the good picture it gives of the chorioidal vessels, and the fact that he still has vision of 14/75.

Discussion.—Dr. Post said that the patient was a railroad engineer. He was now 43 years old and had run an engine up to about three years ago, which was the first time he had noticed any trouble with his sight, so the development of the condition must have been gradual. There was a history of specific infection fifteen or sixteen years ago. Whether the patient had been treated for that, the speaker did not know. It appeared to him to be a case of specific infection where the retina was involved, and he believed it had been a syphilitic retinitis at the start and was now a chorio-retinitis.

Rupture of the Sclera (Patient).—DR. C. BARCK.

This patient was injured about three weeks ago. There was a rupture of the sclera about 1 mm. wide encircling the cornea for about $\frac{1}{3}$ inch of its extent, with an enormous hemorrhage into the anterior chamber. A large amount of blood had been resorbed, the iris is retracted backward, and the scleral wound is considerably wider now. The question comes up whether the crystalline lens is lying in the scleral wound. He had seen a similar case where the lens was lying partly in and partly out of the wound. He simply removed the lens, and saved a certain amount of sight. The question arises, whether it is advisable in this case to remove the lens.

Localization and Removal of Piece of Copper from the Eye.—DR. J. ELLIS JENNINGS.

Geo. A., aged 22, consulted me October 12, 1907, and gave the following history: One month ago at St. Joseph,

Mo., while watching a companion shoot at a mark with a 22-calibre rifle, felt something strike the left eye, presumably a piece of cap from the rifle. In a short time violent inflammatory symptoms set in with severe pain which has persisted up to the present time. Several ophthalmologists were consulted, a skiagraph was made by Dr. Wells, which showed the presence of two foreign bodies. He was strongly urged to have the eyeball enucleated. This he refused to have done, but stated he wanted me to make an attempt to remove the foreign bodies. He handed me the chart locating the foreign bodies, made by Dr. Wells. One foreign body was 1-1/2 mm. in diameter located in the ciliary region on the nasal side, 5 mm. below the horizontal plane. The other not larger than the point of a sharpened lead pencil was some distance behind the first. As no harm could result from an attempt at extraction, I made a section down and in 2 mm. behind the limbus at the point indicating the larger foreign body. I removed a small bit of iris and the foreign body came away with it. I failed to find the smaller piece, and then bandaged the eye. I still urged enucleation, and as the pain continued he finally consented, and the eyeball was removed October 15th, three days later. As the patient had carried away the plotted chart, I asked Dr. Wells to send me a duplicate. He made a second chart and in it localized the second foreign body outside of the eyeball between it and the orbital wall. From a rough drawing of the original chart, I made on my history card, I was sure the second foreign body was in the eyeball. So yesterday I made antero-posterior section of the eyeball, and after a careful search found it midway in the vitreous, embedded in the vitreous. I have not attempted to remove it from its position or to feel of its consistency, as I would like the members present to see it in situation.

Discussion.—Dr. H. P. Wells, referring to his failure to localize the smaller piece of copper, had consulted his plates again and found that the smaller piece which he had localized in the first chart was not as clear as the larger piece. There were three or four little translucent spots in the immediate locality of the foreign bodies, any one of which might have been taken for the smaller piece.

When making the chart that he had sent to Dr. Luedde, he had evidently taken one of these into account, and in making the last chart, which was sent to Dr. Jennings, he had taken one of the others into account. The slightest motion of the eye during the exposure would affect the image in the case of so small a particle. But the fact remained that in the second plate there had been nothing that he could clearly identify as being the shadow of the smaller body. As to the indicator wire covering the foreign body, as mentioned by Dr. Jennings, that was not a possible explanation, for even if the piece had lain immediately in that line in the first exposure, the second exposure was made at a different angle, and it was in the second exposure that the clear image could not be found. Furthermore, if he remembered it correctly, the smaller piece did not lie in the median line as did the indicator wire.

Dr. Wells was far less interested in the successful cases than in those showing discrepancies, and he sincerely hoped that the gentlemen would always advise him when any of his charts failed to agree with the surgical findings. If Dr. Wiener were present he feared that the doctor would contribute another piece of evidence against him, for he recalled one case in which he had found a foreign body near the upper posterior wall of the globe, yet in which the vitreous cleared up entirely and the doctor could see no foreign body with the ophthalmoscope. This case was subjected to a subsequent examination, which located the foreign body about 2 mm. farther posteriorly than in the first localization, placing it just outside the eye. The technical difficulties in this work were numerous, as for instance, the patient might move the eye, or might fail to keep his sight centered on the spot, and thus lead to an error or blurring of the image. Or if there was any condition that interfered with coordination of vision, that would also have to be taken into account. Yet in upwards of a hundred localizations he had not had a case brought to his attention which pointed seriously to any great danger of error that could not be overcome by a sufficient amount of care in the work.

Dr. Barck asked if the radiograph had been taken after

the removal of the first piece of copper or before that.

Dr. Jennings replied that it was done before the removal of the first piece.

Dr. Barck thought the foreign body was probably not now where it was before these manipulations.

Dr. Jennings agreed with Dr. Barck that the foreign body had probably changed its position, but according to the last chart made by Dr. Wells, the second piece was not in the eye at all. Dr. Wells made the first chart about three weeks after the injury. It was easy to understand how there might have been an inflammation and the body as a result pretty well fixed in its position. Then the picture was taken and one piece removed, but a pulling of the tissues forward would not displace the other foreign body backward, so that the position of the copper, if it had been changed by the manipulation, would be forward.

Dr. Wells had no doubt at all that in the first place the smaller body was shown clearly, but he would be utterly unable to locate it accurately unless it showed in both plates.

Tumor of Cheek Adjacent to Lower Lid (Patient).—

DR. H. MUETZE.

(Reported in full, page 217.)

Discussion.—Dr. Luedde thought this to be a tumor involving the connective tissue.

Dr. Louis Rassieur thought it very probably a sebaceous affair, or possibly an atheroma. The skin had grown to the bone, as not infrequently happened when one had gone through the periosteum in operations on the bone. He did not know what other condition of a benign nature could arise there. There were no glandular elements there except those of the skin. The tumor itself could be readily raised from the bone. It might be the result of an implantation of the skin thrust into the wound.

Dr. Ernst Saxl said that to him the whole appeared as a growth extending from the frontal sinus. The frontal sinus would under certain conditions secrete a thick, glairy

fluid. No aspiration syringe of any size would bring out a secretion of this character. He had seen two or three cases in which, as the result of a frontal involvement, the eye was pushed down and the lid increased to four times its size. By frontal involvement he meant an inflammation of the frontal sinus. When it became infected the frontal sinus secreted a thick, glairy secretion resembling egg albumen. Afterward, when it became softer, it might be seen coming out through the infundibulum or through a fistula. A fistula like that took eight or ten months to heal. After the cessation of pus formation there would be continued glairy secretion. The fluctuation here was imperfect, which was always the case in such a condition. If one filled a rubber bag tightly with egg albumen, the fluctuation would be less than if water had been used, because motion was not transmitted so quickly by the albumen as by water.

Dr. Muetze, in conclusion, said that the boy had been struck by a baseball on the right side of the nose last June. Soon after the eye began to water and there appeared a swelling. He had dissected out the sac until the posterior portion was reached, where it seemed attached to the bone, and there it burst. He did not believe the present tumor communicated with the frontal sinus. The first one certainly did not. He intended removing it very soon and would report the result.

Demonstration of the Stereoscopic Scotoma Charts of Haitz.—DR. J. W. CHARLES.

The stereoscope seems to overcome the difficulty we have all experienced in discovering central scotomata. With the aid of the stereoscope it is very easy to determine whether the patient has a scotoma and to map it out. One simply places these charts in the focus of the lenses of the stereoscope and obtains central fixation of the eye to be examined. Even in ordinary cases of heterophoria the eye does not hesitate. It is ordinarily very difficult to obtain the necessary fixation for mapping of small scotomata.

Discussion.—Dr. Luedde stated that this test was so accurate that it had been claimed that it was possible to detect a

scotoma for red after the patient had smoked a strong cigar.

Meeting of January 8, 1908. The Chairman, Dr. Barck, presiding.

Remarks on Serpiginous Ulcer.—DR. A. ALT.

The author reported on recent work done in the investigation of this subject. He drew attention to the fact that the Morax-Axenfeld bacillus is often the cause, although the diplococcus lanceolatus alone or accompanied by staphylococcus is found most often. A bacteriological examination should be made before any treatment is instituted, and if the Morax-Axenfeld bacillus is found, zinc sulphate should be employed to cauterize the ulcer, and the eye should be frequently bathed in a zinc sulphate solution. If the diplococcus is found, Roemer's serum seems to offer in many cases better results than the other forms of treatment hitherto employed.

Discussion.—Dr. Williamson was particularly interested in Dr. Alt's case, for the reason that he had recently had a very unfortunate experience with a case of serpiginous ulcer, the patient being the father of a physician. The patient, 67 years old, had come to his office six weeks before presenting a very virulent conjunctivitis. There was no involvement of the cornea. A smear showed a preponderance of pneumococci and some staphylococci. The ulcer was about the size of a pin head. Although it was cauterized thoroughly, it continued to spread. In two or three days a second focus began to show distinct from the original ulcer. Ordinary treatment, lavage, hot applications, the use of atropin, etc., failed to have any effect, and the ulcer continued to spread and a marked hypopyon appeared. The hypopyon was removed by Saemisch section and the patient was now practically blind from the resulting leucoma. Dr. Williamson believed this would have been an excellent case for serum treatment, certainly all other treatment employed, the use of iodoform, cau-

terization, etc., had absolutely no effect in stopping the process. Such a result was very discouraging.

Dr. Meyer Wiener had recently had a case of serpiginous ulcer at the clinic of the Washington University Hospital which was very slightly developed when the patient arrived. It involved a semicircle of about half the cornea. It continued to grow worse and after four or five days the process stopped and the eye began to get better. In a short time the ulcer was comparatively clean, but remained the same size and shape. This clean ulcer, with no discharge whatever, refused to heal, and it was several weeks before it showed any sign of beginning to fill up, like the malarial ulcers sometimes seen. But the eyeball began to shrink, and finally when the ulcer did heal there was not much vision, with very little scar. The active process was stopped without any perforation, and it had looked at that time as if the patient would get fair vision, but probably on account of the depth and size of the ulcer the nourishment was impaired.

Dr. Clarence Loeb, in regard to the treatment of corneal ulcers, called attention to an article in the July number of the *Annals of Ophthalmology*, in which the production of passive hyperemia was advocated. The writer reported twenty successful cases. In three he failed to effect a cure. He had found that the corneal scar was less dense and the vision much better than under any other form of treatment he had used.

Dr. Carl Barck said that he had just received the second report from the Heidelberg Society on this serum. The serum was now prepared from cultures of the pneumococcus, and had proved successful in a certain number of cases. The clinical picture was changed entirely within a few days after the injection of the serum. The statement had been made that the serum would come into the market through the firm of Merck, about the first of this year, and every tube would be tested before leaving his laboratory by Dr. Roemer. It was certainly to be hoped that this serum would prove effective in cases like the ones reported, which were undoubtedly the most serious of all corneal affections.

JOHN GREEN, JR., Secretary.

Meeting of February 12, 1908.

Presentation of Specimen.—DR. A. ALT.

The eye shown here I removed a week ago from a syphilitic individual. It has been blind for several years and suffering from ever-recurring attacks of cyclitis dolens. The most interesting part is what, externally, appears to be a beginning equatorial staphyloma. When I bisected the eye I found a large atrophic spot in the chorioid, as you see here, corresponding with this apparent staphyloma. On cross-section it is, however, plainly seen that, instead of a thinned and bulging sclerotic, we have before us a thickening of the tissues, starting from the chorioid, and involving the sclerotic. I think, therefore, that this represents a healing gumma of the chorioid and sclerotic. The patient has been under antisymphilitic treatment for some time. (The microscopic examination proved this view to be correct.)

A Case of Retinitis Pigmentosa.—DR. JOHN GREEN, JR.

This case differs from the typical retinitis pigmentosa only in the sparse distribution of the "bone-corpuscle" pigment masses. It has been stated that certain cases otherwise indistinguishable from this disease may be wholly without pigment. Opinions of the members regarding this point are requested.

Discussion.—Dr. J. Ellis Jennings had observed one or two cases of what he believed to be retinitis pigmentosa without the pigmentation.

Dr. Haywood Post had had two cases in which there was a contracted field, but no pigmentation. One of these cases he believed had at one time been in the hands of Dr. Shoemaker.

Dr. A. E. Ewing had seen one case of retinitis pigmentosa in which there was a shrinkage in the field, but no pigmentation that he could detect.

**Sudden Blindness Following Injury.—DR. LLEWELLYN
WILLIAMSON.**

This patient presented himself at the clinic of the Washington University day before yesterday, stating that ten days ago he had been struck in the eye with a brick. There

is still some contusion, and a scar over the right brow. After being struck he felt very dizzy and held his hand over his eye for some time. Upon removing it, he found that he could not see. When first seen, his pupil was dilated, immobile and with absolutely no light perception. The ophthalmoscopic examination showed a large hemorrhage to the upper and outer side of the disk, and a small hemorrhage in the region of the macula. No other findings. Why this man is absolutely blind I am rather at a loss to know. There may be a hemorrhage in the sheath of the nerve or there may be a fracture of the orbit with injury to the nerve itself. The fact remains that he has absolutely no perception of light. Possibly some of you gentlemen can discover the reason for it.

Discussion.—Dr. Henry Muetze thought the blindness was due to the injury to the optic nerve. There is quite a dent in the supraorbital ridge. Undoubtedly when the man was struck, the roof of the orbit was driven back, partly, or entirely, severing the nerve. He had seen a somewhat similar case several years ago in which a railway conductor had been injured by being struck by a mail crane. It had seemed probable in that case also that the blindness was due to injury to the nerve, and the diagnosis was borne out by a complete atrophy later. Yet one should be guarded in the prognosis of these cases. He had seen, not long before, a patient, a physician, who had fallen on the sidewalk and sustained a severe injury to the base of the skull. In this case there had been only recognition of movements of hand at three inches, total absence of recognition of colors and marked blanching of the disk within a few weeks after the injury. The usual treatment had seemed of no avail, and had been abandoned after a couple of months. The speaker had given a very grave prognosis. The patient spent several months in Europe, and upon his return it was found that his vision was about 10/20. After that experience Dr. Muetze thought one could not be too careful in the prognosis of those cases of injury to the optic nerve in which absolute blindness does not supervene shortly after the injury.

Dr. Adolph Alt said that before making a definite statement he would like to be certain whether the hemorrhage

was in front of, or behind, the retina. In one of his cases, following an attempt at suicide by shooting, there had been an extensive rupture of the chorioid, and a rupture of the retina. It might be that in this case these hemorrhages were not in the retina, but in the chorioid. Of course, the blindness was due to a fracture of the optic foramen, in whatever way that was produced.

Dr. Williamson stated that this was retinal hemorrhage, that there was no sign of rupture of the chorioid. The exact character of the injury he could not definitely determine, but the prognosis, he thought, was probably bad.

Opaque Nerve Fibers.

(Exhibition of Two Unusual Cases.)

DR. J. F. SHOEMAKER.

Opaque, or medullated, nerve fibers were first demonstrated by Virchow, anatomically, before the days of the ophthalmoscope.

The medullation of nerve fibers occurs late in intra-uterine life and begins centrally, proceeding toward the periphery. The optic nerve is the last of the cranial nerves to become ensheathed, according to Westphal, and von Hippel states that it is not until one or two months after birth that the process has extended to the eyeball where it usually stops. Occasionally some of the nerve fibers take on the medullary substance after they have passed through the lamina cribrosa. In the rabbit there is normally a transverse band of these opaque fibers. In man, when they occur, they are usually around the papilla and contiguous to it. Generally situated above or below the disk, they may be on the nasal side or, very rarely, on the temporal side. When occurring on the temporal side, they stop short of the macula, as a rule, although Hawthorne states that they may involve the macula, when, of course, central vision is absent.

Wagenmann and Nettleship have made the interesting observation that where medullary nerve fibers are present in the retina they lose their medullary sheaths when the fibers degenerate, as, for example, upon the onset of optic

atrophy. Pflüger has demonstrated the same facts in rabbits. Frost has made similar observations in glaucoma.

The point of interest in the two patients presented, is the unusual position of the opaque fibers. In the one case there is a good-sized spot of them in the upper temporal quadrant of the fundus, about four disk diameters from the optic nerve, the rest of the retina being normal. In the second case they are situated in the lower nasal quadrant, between two and three disk diameters from the nerve; the retina, otherwise, being entirely normal.

The appearance of the opaque fibers in the periphery of the fundus is quite unusual, no mention being made of their being found in such position by such authors as Fuchs, Swanzy and de Schweinitz.

Discussion.—Dr. Clarence Loeb stated that this was the first case he had seen of opaque nerve fibers at a distance from the disk. It would be very interesting to see a field of vision chart, and an outline made of the opaque nerve fibers.

Dr. Llewellyn Williamson, while assistant at Moorfields, had seen a case in which there was a large bunch of opaque nerve fibers, at a considerable distance from the disk and not in any way connected with it. It was looked upon as quite a rarity in that hospital where the clinical material was enormous.

A Case of Sarcoma of the Right Orbit.—H. MUETZE, M. D.
(Reported in full, page 217.)

Discussion.—Dr. Adolph Alt had had experience with a number of such cases, always in small children, where the tumor was always a round-cell sarcoma. After operating on the last case, he had determined never again to operate on another case without complete exenteration of the orbit. In one case he had cleaned out the orbit as thoroughly as possible, the child had almost died on the table, yet in three months' time there had been a return of the growth. To avoid fatal results, it was necessary to take away not only the tumor, but the whole orbital tissue.

Dr. Williamson showed two pictures of a case he had seen last spring. One picture taken at the child's first visit showed an almost imperceptible bulging of the eye. The

other picture, taken seven weeks later, showed an enormous proptosis, the eye being almost out upon the cheek. The child was operated on by the country practitioner, but four weeks later was sent to the Martha Parson's Hospital in St. Louis, with a return of the growth, the tumor mass filling the orbit and involving both lids. Complete exenteration of the orbit with removal of periosteum and both lids was performed, but the growth again returned, although very slowly. An effort was made to try the effect of Colley's fluid, but before a supply could be obtained from New York, the mother took the child away, refusing all entreaties to leave it longer in the hospital. Shortly after the child was taken home, it became blind in the other eye and soon died. The whole course of the case was about three or three and a half months. Operative procedure in these cases never seemed to avail much.

Dr. John Green, Jr., stated that last summer he had seen a case at the Skin and Cancer Hospital in consultation with Dr. George S. Drake, in which there was a tumor of the orbit and complete destruction of the globe. Dr. Drake did a very thorough operation. Of course, after such an operation, there was the greatest deformity. To obviate this as much as possible, Dr. Drake brought down a piece of skin from the brow and sutured it in place below. The wound had healed very well, and the deformity was much less than if no attempt had been made to fill the gap. Replying to a question by Dr. Ewing, Dr. Green stated that the patient was about 60 years old.

Dr. Henry Muetze asked if any of the gentlemen had ever seen one of these cases of round cell sarcoma recover.

Dr. Clarence Loeb, while with Dr. Barck, had seen a case in which Dr. Barck had been forced to do a complete exenteration of the orbit. The tumor had been operated on once before. The operation, done by Dr. Barck, four years ago, had been followed by recovery. The patient was forty years old or over. He could not state the nature of the growth.

Dr. Green referred to a report by Dr. Fox of Philadelphia of a case in which he had had a surprisingly good effect from the use of x-rays. The growth in this case had been enormous and inoperable, yet the x-ray treatment produced

to all intents and purposes a cure. This case was reported about four years ago, at a time when there were many good reports of the x-ray being published.

Dr. H. W. Luedde spoke of the case of the little girl presented at the November meeting. The tumor had pushed the eye up and was entirely within the orbit. Dr. Mudd had done a complete exenteration, but the growth had returned and the child became blind in the other eye and finally died.

LLEWELLYN WILLIAMSON, Section Editor.

BOOK REVIEWS.

A Study of the Ocular Manifestations of Systemic Gonorrhea with Reports of Cases of this Nature.

By W. GORDON M. BYERS, M. D., Assistant Oculist, Royal Victoria Hospital; Lecturer in Ophthalmology, McGill University, Montreal.

This valuable monograph of 229 pages is one of a series of "Studies" upon medical subjects by members of the Staff, and workers in the wards and laboratories of the Royal Victoria Hospital, Montreal, Canada. These studies are published in attractive form at irregular intervals, and comprise such as are, on account of their length, unfitted for publication in medical journals.

Dr. Byers has covered his subject in a most complete and comprehensive manner, systematically reviewing the history, the general pathological, clinical, and therapeutical considerations, and then in turn all the various portions of the eye and its adnexa which may fall heir to the influences of systemic gonorrhea.

Ninety-two cases from the literature and from his own clinical material are given in resumé, and finally a most excellent bibliography of one hundred and seventy-six references extending from 1800 to the year 1907. The author's conclusions are important and interesting, and as given by him, are in part as follows:

1. The early British and French writers were the pioneers in the development of our knowledge of gonorrheal ocular metastases. From the first, gonorrheal iritis has been uninterruptedly recognized by the profession; but after 1850 the general practitioners alone continue to believe in a metastatic conjunctivitis. The specialists, influenced by the work of Piringer, went to the opposite extreme and accepted the theory of direct infection; but they have been again forced into recognizing metastatic conjunctivitis through the bacterial investigations of Neisser's discovery.

2. Systemic gonorrhea most commonly occurs in males,

in those cases in which the posterior urethra and the contiguous structures are involved; but nothing definite is known in regard to the factors which underlie the undoubted predisposition of certain individuals to this disease.

The accumulating pathological evidence seems more and more to show that the gonococci themselves, and not their free toxins or the secondary or mixed infections, are responsible for the local manifestations.

Metastatic inflammations of the eye, of gonorrheal origin, are marked, in general, by uncertainty and irregularity as regards the time of their occurrence, the extent to which the parts are involved, the severity of their symptoms, and their course and behavior; by their close association with metastases of like origin in other parts of the body; and by a marked tendency to relapse, and to recur with fresh gonorrheas.

Ocular inflammations are often first manifestations of systemic gonorrhea, and there is every reason to believe that they frequently form the sole expression of this condition.

Patients with systemic gonorrhea should be treated as those actually suffering from an infectious disease; and, as there are grounds for thinking that gonorrheal metastases pick out points of lessened resistance, excessive use of the eyes, while the systemic infection is in progress, is to be deprecated.

3. Metastatic gonorrheal conjunctivitis is a well established clinical entity. It occurs at any time during the course of a systemic gonorrhea, but apparently more often than the other eye conditions as an initial manifestation. The infection is almost invariably bilateral, and both eyes are usually simultaneously involved. The objective appearances, and the subjective symptoms differ little, if at all, from those of any of the so-called acute "catarrhal" inflammations of the conjunctiva. The discharge is typically slight in amount, and almost always mucoid in character. Pure cases run their course in two weeks; but in thirty per cent. of the patients, the inflammation is complicated by affections in other coats of the eye. Some of these at least are of the nature of deep-seated metastatic inflamma-

tions which throw light on the true nature of the conjunctivitis. Relapses occur either alone, or, more often, in association with affections of other parts of the globe.

4. Though it is impossible at the present time to determine its exact mode of development, a keratitis occurs in association with systemic gonorrhea which is typically of a multiple and superficial nature, and commonly symmetrical in character, and central in situation.

5. The deep-seated congestion sometimes observed in metastatic conjunctivitis is often only an expression of an inflammation of the interior structures of the globe, actually present, or in the process of development. The cases of pure sclero-conjunctivitis, which apparently do occur, ought to be differentiated from metastatic conjunctivitis, and classed by themselves.

6. In every so-called iritis the pathological process is by no means limited to the iris, but extends at least to the adjacent divisions of the uveal tract. It is justifiable, and perhaps even advisable to discard the word iritis, and substitute the terms mild or severe iridocyclitis, the better to express the character and extent of the changes known to be present in these cases.

7. There are no figures to show what part the gonococcus plays in the production of the inflammations of the uveal tract, viewed collectively; but, taking the statistics for iritis as an index, it would seem that the percentage of cases, attributable to this organism, varies as a result of differences in the social hygienic conditions of the places in which the statistics are collected.

Generally speaking, metastatic gonorrheal affections of the uveal tract show a tendency to be double-sided in the first, as compared with the second and later attacks, and to relapse, and to recur with fresh gonorrheas. They precede, or follow, or break out simultaneously with other manifestations, or form the sole expression of the systemic infection; but they are marked by no special features, except that swellings of any kind in the iris tissue are never observed. Gelatinous exudations are more indicative of the severity of these inflammations than of their origin. An associated metastatic conjunctivitis is suggestive. The purulent forms, which often show no sharp lines of demar-

cation from the plastic, are often marked by an extraordinary tendency to recover.

8. The metastatic gonorrheal inflammations of the optic nerve and retina commonly take the form of a diffuse and scarcely measurable neuro-retinitis, associated, at times, with considerable retinal edema. The cases follow the rule, that when the nervous apparatus of the eye is solely involved the affection is bilateral, but when it is implicated along with the uveal tract, the neuro-retinitis is unilateral in character. The pathological evidence favors the blood-vessels rather than the lymph spaces as being the principal route for the infection in these conditions. The prognosis must be guarded, though, generally speaking, the outlook is good.

9. The cases of dacryoadenitis, which have been attributed to systemic gonorrheal infection, conform to what is known of inflammation of the lacrimal gland in general, namely, that while the cases caused by the direct extension are generally unilateral and go on to suppuration, those produced by metastasis are usually bilateral in character, and end in resolution.

WM. T. SHOEMAKER.

Bier's Hyperemic Treatment, in Surgery, Medicine and the Specialties.

BY WILLY MEYER, M. D., New York, and PROF. DR. VICTOR SCHMIEDEN, Berlin, Germany. W. B. Saunders Company, Philadelphia and London, 1908. Price, \$3.00.

Professor August Bier first published his hyperemic treatment about fifteen years ago. The importance of the principles involved, and the application of the treatment in one or more of its several forms, to a steadily increasing number of diseased conditions, have commanded in this country the attention of physicians in all branches of medicine and surgery. The practical work of Drs. Meyer and Schmieden comes as a most useful and timely contribution to the subject, for like most therapeutic measures, misapplication of Bier's hyperemic treatment, results in harm instead of good. And there can be no question that many who have tried to derive the benefits of obstructive hyper-

emia have utterly failed to comprehend the underlying principles, and the all important technique. The authors cannot emphasize too strongly Bier's first and most important principle of hyperemic treatment, namely, *the blood must continue to circulate; there must never be a stasis of blood.* This is the sine qua non, and just how to accomplish it, is described by the authors in a manner which for clearness and conciseness could not be excelled.

Three methods are employed by which hyperemia may be produced:

1. By means of an elastic bandage or band.
2. By means of cupping glasses.
3. By means of hot air.

One and two produce a passive or venous hyperemia, three an active or arterial hyperemia.

The first three chapters of the book treat of the advantages of the hyperemic treatment over other methods, general rules of application, etc. In the special part the treatment of special diseases by means of artificial hyperemia is considered in detail. It is interesting to note that in syphilitic affections, no positive results have been obtained, and the suggestion is made that the negative results from the treatment might perhaps be considered as confirmatory of syphilis—a new therapeutic test.

Also of interest is the observation that malignant tumors are apparently made worse, and grow more rapidly under the treatment.

The hyperemic treatment in ophthalmology offers, according to the authors, many possibilities, and should be given a careful trial and study by those interested. With regard to progressive optic atrophy, in the presence of which the ophthalmologist has the feeling of absolute helplessness, the authors say, "The question whether gentle head-hyperemia will influence the interior of the eye also, has not been definitely settled as yet. Still, sufficient proof seems to have been rendered for the assertion that the various membranes of the bulbus, inclusive of disk and retina, participate in the effects of a moderate hyperemia, such as results from the application of the neck-band. It seems to have been proven by the fact that marked improvement from this

method has recently been seen in a few cases of progressive optic atrophy with pronounced anemia of the optic nerve, a result, which, a priori, seems but natural and altogether plausible, provided the trouble has not advanced too far."

Their results with acute dacryocystitis with abscess formation have been, they say, brilliant. Parenchymatous keratitis likewise has been favorably influenced.

Regarding sympathetic ophthalmia, to quote again, "It is to be expected that cases of sympathetic ophthalmia will yield to obstructive hyperemia, particularly if the latter be applied at an early stage of the trouble."

Throughout the book, the authors repeatedly urge that the hyperemic treatment is not a panacea, that it is not to be used to the exclusion of other valuable means, and wherever pus is present, it must be surgically evacuated.

The book will be found to be most useful and instructive to physicians and surgeons regardless of specialty, and will certainly stimulate the reader to crystallize and put into proper application some of the hazy notions which he might have regarding Bier's hyperemic treatment.

WM. T. SHOEMAKER.

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HERMAN SNELLEN, SR.

FEBRUARY 19, 1834—JANUARY 18, 1908.

(Translated from *Zeitschrift für Augenheilkunde*.)

Dr. Herman Snellen, Sr., Professor-Emeritus of Ophthalmology in the University of Utrecht, after an extended period of sickness died at that place January 18, 1908.

He was born on February 19, 1834, at Zeist, a beautiful village not far from the place of his later activities. His father was F. A. Snellen, M. D. In 1851 he entered the University of Utrecht to study medicine, where his educational development was much impressed by his teachers, especially G. J. Mulder, Schroeder von der Kolk, and Donders. While yet a student he manifested a great tendency for independent research, of which evidence is found in a contribution issued 1845 "On the Influence of the Pneumogastric Nerve on the Movements of Respiration." On July 4th, after the successful presentation of his inaugural dissertation: "An Experimental Study of the Influence of the Nerves on Inflammation," Snellen was promoted to the title of Doctor of Medicine. In this, as is known, he predicted the observations of Magendie regarding the cause of keratitis following the division of the trigeminus nerve. One year later he was advanced to the degree of Doctor of Chirurgy, after which he began the practice of medicine in Utrecht. At this time Snellen advanced in closer relation with Donders who was then conducting a polyclinic

and private consultation in ophthalmology at that place. When in the year 1858 through the exertion of Donders the first Netherland eye sanatorium was opened,* Snellen was appointed first resident assistant. He, however, continued general practice for four years, finding time to publish a monograph on the epidemic of cholera at Utrecht. In 1862 Snellen advanced to the position of director in the *Augenheilanstalt* of which Donders remained director in chief. Henceforth Snellen devoted his time exclusively to ophthalmology and became a skilful operator. Donders was too much occupied with his professorship of physiology to give the required attention to the operative phase of ophthalmology, nor did he possess for this science much inclination and talent, thus yielding the operations entirely to Snellen, who with an excellent technique and skill discharged his duties with credit. Snellen became renowned as an operator not only in his own country, but his reputation ranked high abroad. He originated many new operative methods, while he improved others and published them through large circles. In 1862 Snellen published his *Optotypen* which were rapidly adopted in all civilized countries, and are still extensively employed. Many methods of examining the eye were contrived by Snellen as well as existing ones improved. The numerous results of his labors in this field are enumerated in the "Functions-prüfungen des Auges" (Demonstrations of Eye Functions) which Snellen and Landolt edited for the *Handbuch von Graefe-Saemisch*.

The distinguished scientific reputation of Donders at that time attracted many well known and eager students of ophthalmology to Utrecht. This gave Snellen an opportunity to compare views on many important problems of practical ophthalmology with men of leading rank, which materially tended to bring Snellen to the fore both at home and abroad. In this manner he exerted without doubt a marked influence on the development of operative ophthalmology during the last half century.

As official instructor in the University of Utrecht he began in 1877 when he was appointed professor of ophthalmology there, having previous to this declined a call to

*Nederlandsch Gasthuis voor behoeftige en minvermogene ooglijders.

Bern and also to Leiden, not wishing to sever his intimate co-operation with Donders.

Snellen was also a distinguished teacher. All specialists of ophthalmology, up to a few years, in the Netherlands had been his students. Nor was his efficient instructorship less fruitful in the qualification of the general physician. Many a military surgeon's subsequent development into an ophthalmologist was due to the basis of information received from Snellen, the blessings of which inured to the benefit of civilization in benighted countries.

In 1884 Snellen became the successor of Donders in the directorate of the eye sanitarium of Utrecht. With undaunted fortitude he strove to carry this institution to the high ideal at which his teacher and friend had aimed, and the evidence of his success is now witnessed by the present monumental structure which since 1894 houses the clinic and which answers all the requirements of modern ophthalmology. He remained the head of this institution until 1903.

In 1899 Snellen severed his connections with the university, this being shortly prior to the session of the International Congress of Ophthalmology at Utrecht. He believed he should share a part of his work with the younger minds. The members of this Congress, to which Snellen was elected presiding officer, were afforded the pleasure of seeing the amiable scholar in his full activity. However, age made its impress a few years afterward. To his great sorrow he could not complete the collaboration of the operative science in the *Græfe-Saemisch Handbuch*. He withdrew to private life and for two years contented himself within the home circle, until on the 18th of last January pneumonia terminated his fruitful life.

Ophthalmology loses in Snellen a leader, especially practical ophthalmology, for the art of operation and the methods of investigation and diagnosis owe much to him. Although, due to his constant activity in his practice, the number of his publications are not so numerous, Snellen, nevertheless understood how to disseminate his ideas over an extended field. In diligently attending the special congresses, he was enabled to remain in touch with the leading men in our domain. Especially did the Heidelberg as-

sociation, of which he was a member for a long time, afford him excellent opportunity to acquaint his brother specialists with his new observations.

Snellen served his fatherland particularly inasmuch as he brought operative ophthalmology there to its full development. Although the names of Snellen and Donders are viewed in a more or less restricted sense abroad, it must be confessed that in the Netherlands they stand at the upper rank, since these two illustrious men—the physiologist and the surgeon—effected a harmonious unity. The memory of Snellen, who constructed the ground work for the development of ophthalmology, shall ever be held by us in high esteem.

T. T. BLAISE,
Translator.

W. KOSTER,
Gzn-Leiden.

ABSCESS IN THE ZYGOMATIC FOSSA.*

MATTHIAS LANCKTON FOSTER, M. D.,

NEW YORK.

An exhaustive examination of the medical literature of the world I believe to be an impossibility today and therefore do not claim to have made one, but such an examination as I have made has failed to reveal the record of any case similar to the one about to be reported. The great rarity of the condition, its exceedingly serious possibilities and the difficulty, as well as the importance, of a correct diagnosis appear to render it worthy of record.

The patient was referred to me by Dr. D. J. Maloney, of Waterbury, Conn., who has kindly furnished the larger part of the clinical history.

Mrs. I. B., 55 years of age, awoke in the morning of May 16, 1906, with pain in her left cheek and eye, some swelling of the side of the face and some congestion of the eyeball. She had retired during the preceding evening very tired from a hard day's work washing, but otherwise apparently in good health. A physician was called in who prescribed, but gave no relief. Two days later another physician was called, who ordered a linseed meal poultice and later lanced the gum above the carious stump of the left canine tooth, but found no pus. All of the teeth on the left side of the upper jaw were badly decayed, and had given her much pain in former years. Not until after the final operation was it learned that at this time the patient was unable to open her mouth, and that the physician was unable to force her jaws apart or to make his incision as far back in the gum as he desired. This important symptom, which might have furnished the clue to the true diagnosis, was not mentioned to either Dr. Maloney or myself until comment was made on the strangeness of its absence before the patient's son during her convalescence. After the incision had been made in the gum the application of poultices was resumed, and a day or two later a profuse flow of pus appeared. By this time the swelling of the face and the ex-

*Read before the New Rochelle Medical Society, February, 1908.

ophthalmos had become great, but neither one was lessened by the escape of pus. Another incision was made in the gum, but no more pus found.

Twenty-six days after the onset of the disease Dr. Maloney was consulted. At this time the exophthalmos of the left eye was intense and the side of the face was greatly swollen. The patient was admitted to the Waterbury hospital, where under cocaine anaesthesia an incision was made through the conjunctiva in the lower fornix. No pus was discovered, but on the next day there was a free discharge from the wound. Although the incision was kept open this was followed by no diminution of the exophthalmos. A week later, under ether anaesthesia, the swelling over the stump of the canine tooth was incised again, but no pus found. A knife about as large as a Graefe knife was then introduced between the rectus and oblique muscles and passed into the posterior part of the orbit in four places, but without discovery of pus. The antrum was then opened near the canine tooth, but likewise without result. On the following day there was a profuse discharge of pus from the incision on the nasal and lower side of the eyeball, but in spite of this the exophthalmos did not decrease, and the vision was rapidly failing. Early in July the lower lid appeared to be particularly swollen near the outer canthus, and an incision at this point evacuated a large quantity of pus. A probe was introduced and passed along the margin of the orbit to the nasal bone adjoining the lachrymal sac. Although the discharge from this wound continued to be very profuse, the exophthalmos persisted. A nasal specialist was consulted about this time who removed a slightly enlarged middle turbinate on the left side and explored the ethmoidal cells, but did not find the accessory sinuses involved.

The patient was then referred to me at the Manhattan Eye and Ear Hospital where I saw her on July 30. At this time the left side of the face was somewhat swollen, there was a considerable degree of exophthalmos of the left eyeball, the conjunctiva of which was red and somewhat oedematous, the cornea hazy, the vitreous cloudy, the optic nerve atrophic and the vision reduced to an uncertain perception of light. At the lower margin of the orbit, and run-

ning parallel to it was a linear cicatrix with a sinus at about the junction of its middle and outer thirds which led backward and inward along the floor of the orbit to form an apparently blind pocket in which no dead bone could be detected. Under ether anaesthesia an incision was made along the lower margin of the orbit and the sinus followed to its extremity. Beyond this the periosteum was pressed back and separated from the bone by means of an elevator, and a subperiosteal collection of fluid found that extended backward and outward from the inner wall of the orbit. This area of exposed bone was carefully examined for caries or an aperture which might lead to the ethmoid bone or elsewhere, but nothing of the sort could be found and the periosteum seemed to be thoroughly adherent around this area. No evidence of the presence of a retrobulbar tumor or abscess was detected. On the following day I found that fully two-thirds of the periosteum which had been detached by the collection of fluid had become reattached to the bone, and the patient felt much relieved.

A tentative diagnosis of a possible syphilitic origin of the trouble had already been made in spite of the absence of a history or of symptoms which could render it positive, and iodide of potassium had been given in increasing doses until at this time the patient was taking quite large doses and had exhibited no signs of iodism. The periostitis I had found seemed to confirm this diagnosis, so treatment with large doses of iodide of potassium was maintained, the area of exposed bone grew smaller and the exophthalmos gradually decreased. On August 9 the oedema of the lids was much less and there was no longer any discharge from the sinus. On August 31, the patient was discharged from the hospital with the sinus still open and leading to a small area of exposed bone in the floor of the orbit.

Dr. Maloney now resumed the care of the case, kept the sinus open and maintained the administration of the iodide of potassium, giving as much as seventy-five grains three times a day, with occasional small doses of mercury. Physiological symptoms were readily obtained from the mercury, but none were ever produced by the iodide of potassium. Still the sinus persisted and the patient returned to me in January, 1907.

At this time there was only a slight degree of exophthalmos of the left eye, the cornea was partially opaque, the nerve was atrophic and there was no perception of light. The lower lid was in a state of ectropion due to a deeply sunken cicatrix at the lower margin of the orbit. A sinus led backward from near the outer extremity of the cicatrix through which a curved probe could be passed downward into a cavity that was thought at first to be the antrum, but careful examination again failed to detect any trouble in either the antrum or any of the other accessory sinuses. The right eye was normal throughout with the exception of a large mucocele of the lachrymal sac, which was removed after the patient had recovered from the condition on account of which she had primarily sought relief.

On January 18, under ether anaesthesia, an incision was made along the above mentioned cicatrix in the lower lid and the periosteum was pushed back until the opening through which the probe had passed was brought into view, when it was immediately recognized as the anterior end of the sphenomaxillary fissure. All of the denuded bone was in a perfectly healthy condition, but granulations could be plainly felt in the cavity into which the probe entered. The anterior end of the fissure was enlarged with a sharp spoon sufficiently to permit the introduction of a curette with which a large quantity of granulation tissue was removed. The cavity was roughly pyramidal in shape, in front the smooth bony wall of the superior maxilla could be felt, backward and downward the irregular projections of the pterygoid process could be distinctly recognized, directly backward was the smooth surface of the sphenoid, and the spaces between the bones were filled with muscle tissue. A probe passed through the sphenomaxillary fissure and pressed downward could be felt plainly behind the ramus of the lower jaw. These landmarks rendered it certain that the cavity was that of an abscess in the zygomatic fossa which had entered the orbit through the sphenomaxillary fissure. After I had removed all the granulations that I could and the hemorrhage had ceased, the cavity was irrigated thoroughly with salt solution, the skin adherent to the bone and the tissues of the lid was dissected free, the cavity packed with sterile gauze, the

larger part of the wound closed and a dressing applied. Recovery was prompt and uneventful, except that the patient suffered considerably from neuralgia, induced, I doubt not, by injury to the trigeminus during the curettage. This neuralgia gradually improved and was much better at the end of a week, when the sinus had become definitely healed.

On September 23, 1907, Dr. Maloney furnished me the following statement as to her condition: "No exophthalmos. The cicatrix in the lower lid has absorbed very much and except for some prominence of the lower part of the eyeball there is no great deformity. No view of the fundus as the cornea and lens are slightly opaque. Patient is well and has no pain."

The diagnostic points in a case of this nature are the sudden onset of pain, tenderness and fever with swelling of the side of the face and congestion of the ocular conjunctiva, followed in a short time by immobility of the lower jaw, possibly not absolute but very marked, due to the pressure exerted upon the muscles of mastication at their origins in the various parts of the zygomatic fossa, and a protusion of the eyeball caused it may be by a direct extension of the inflammation to form a retrobulbar cellulitis, by the passage of pus from the fossa into the orbit through the sphenomaxillary fissure, or possibly by an orbital oedema produced by thrombosis of the inferior ophthalmic vein, which sometimes passes through the sphenomaxillary fissure to join the pterygoid plexus. The latter cause of the exophthalmos may be excluded in the present case by the absence of other signs of thrombosis, the rarity with which the inferior ophthalmic vein follows that course, and the fact that it would probably produce an essentially different picture than the one presented here. The condition to be expected from such a thrombosis of the inferior ophthalmic vein would be a displacement of the eyeball upward and forward, marked chemosis of the lower portion of the ocular conjunctiva and swelling of the lower lid, while the upper part of the conjunctiva, the upper lid and the vessels of the optic nerve and retina would be affected secondarily and to a comparatively slight degree, but in this case the eyeball was projected directly forward, both

lids and all parts of the ocular conjunctiva were about equally affected, and the circulation through the vessels of the optic nerve was seriously interfered with. The fact that five incisions were made through the conjunctiva into the posterior part of the orbit without finding pus about a month after the commencement of the trouble, and at a time when the exophthalmos was very great, seems to demonstrate that the latter was not caused by an eruption of pus into the orbit, while the probability that the exophthalmos was due to a retrobulbar cellulitis induced by extension of the inflammation by contiguity from the zygomatic fossa is supported by the fact that there was a subsequent discharge of pus from two of these incisions without any decrease of the prominence of the eyeball.

Two conditions deserve special study, the evidence that the lesion was situated to the nasal side of the orbit, and the periostitis.

The results of the earlier interventions in the orbit were extremely misleading, as they seemed to direct the surgeon to the nasal side, directly away from the real seat of the trouble and toward the accessory sinuses, empyema of which produces not infrequently a similar condition in the orbit. Four incisions were made by Dr. Maloney deep into the orbit between the recti and obliqui. On the following day there was a free discharge of pus from the wound on the lower and nasal side of the eyeball. Some days later he incised the lower lid near the outer canthus, evacuated much pus and explored the cavity with a probe, which led him along the margin of the orbit to the nasal bone adjoining the lachrymal sac. The only explanation of this misleading condition which occurs to me is that the cellulitis in the nasal part broke down into pus, while that in the rest of the orbit did not, and that the pus burrowed along the margin of the orbit to near the outer canthus, where it was evacuated. The persistence of the swelling of the side of the face after the failure to find pus in the antrum was the only symptom which could have suggested a possible error in the indication that the lesion was situated to the nasal side of the orbit.

The origin of the subperiosteal collection of fluid which I evacuated at my first operation is not clear to me, but

the most plausible explanation seems to be that the inflammation of the adjacent tissues in the orbit was communicated to a small portion of the periosteum of the floor, which resulted in an accumulation of fluid beneath it, the evacuation of which was without influence on the course of the original disease.

Another point of interest is the tolerance exhibited by this patient to enormous doses of iodide of potassium. The urgency of the symptoms, together with the failure to discover the seat of inflammation led to the tentative use of this drug in spite of the absence of any history or definite symptom which might indicate the presence of syphilis. The discovery of the periostitis seemed at first to confirm the theory of a syphilitic basis, but now it seems to me that this theory must be discarded for lack of support and that the remarkable tolerance of the patient to this drug is to be explained as an idiosyncrasy.

Finally the etiology of the case demands attention. The zygomatic fossa has no direct connection with the air and seems to be isolated from the danger of external infection. It communicates with the orbit by means of the spheno-maxillary fissure, and with the sphenomaxillary fossa by means of the pterygomaxillary fissure. The latter fossa communicates with the orbit and the cranial cavity and also with the superior meatus of the nose through the sphenopalatine foramen which transmits the sphenopalatine vessels and nerves. If we admit the possibility that infection might travel up this foramen, a possibility of which it is difficult to conceive, the resultant inflammation would probably follow a different clinical course. This fossa is situated just below the apex of the orbit and the onset of inflammation within it might be expected to cause exophthalmos, but not a swelling of the side of the face until the products of the inflammation had broken through the pterygomaxillary fissure into the zygomatic fossa. But in this case the swelling of the side of the face was the first symptom, with the exophthalmos following. Again if the abscess had originated in the sphenomaxillary fossa the line of least resistance to the escape of the pus would have been uncertain, but from its close relations to the cranial cavity meningeal symptoms might reasonably have been

expected, but these were absent. No symptoms appeared at any time which can be considered to point toward the inflammation of the tissues in this fossa, and though their involvement cannot be excluded positively it is extremely unlikely that they formed the seat of the primary focus and that the infection entered through the sphenopalatine foramen. The portion of the orbit into which the sphenomaxillary fissure opens is thoroughly protected against direct infection from outside by the tissues contained in that cavity. Hence it is difficult to conceive of any means by which the suppuration in this case can be ascribed to external infection. The only remaining means by which the abscess could have been produced is by internal infection, or metastasis, from some purulent focus elsewhere in the body. All the teeth on the left side of the upper jaw were carious and there was a large mucocoele of the right lachrymal sac, and as no other focus was found I am inclined to believe that in this case the inflammation was excited by the lodgment of pathogenic organisms transmitted through the blood or lymph channels from either a carious tooth in its near neighborhood, or the mucocoele of the lachrymal sac on the opposite side of the face, with the probabilities in favor of the former because of the propinquity of the carious teeth to the site of the abscess and the much shorter course to be followed in the transmission of infection from one to the other.

616 Madison Avenue.

A NEW APPLANTATION OPHTHALMOTONOMETER.*

EDWARD B. COBURN, M. D.,

NEW YORK.

Several methods may be employed to determine ocular tension as follows:

(I) Direct—Intraocular.

By introducing into the eye (usually the anterior chamber) a canula which is connected with a mercury manometer.

(II) Indirect—Extraocular.

(1) By ophthalmometric determination of the curvature of the cornea.

(2) By digital pressure.

(3) By instrumentation—ophthalmo-tonometry.

(A) Applantation tonometry.

(a) Applantation effected by a given weight or force.

(b) Force necessary to effect a predetermined area of flattening.

(B) Impression tonometry.

(a) Impression effected by a given weight or force.

(b) Force necessary to cause a given impression.

All methods of measuring ocular tension are subject to error though the first (I) is most accurate. It has the disadvantage that it cannot be employed with impunity on the human eye.

The second (II) method fails in accuracy in that proper allowance cannot be made for the resiliency of the ocular tunics, which vary with age, and for the variation in the curvature of the eye, etc.

With one exception (the tonometer of Maklakoff) all of the instruments depend for their measurements upon weighted levers or springs, and their readings are recorded

*Read before the Section on Ophthalmology, New York Academy of Medicine, April 20, 1908.

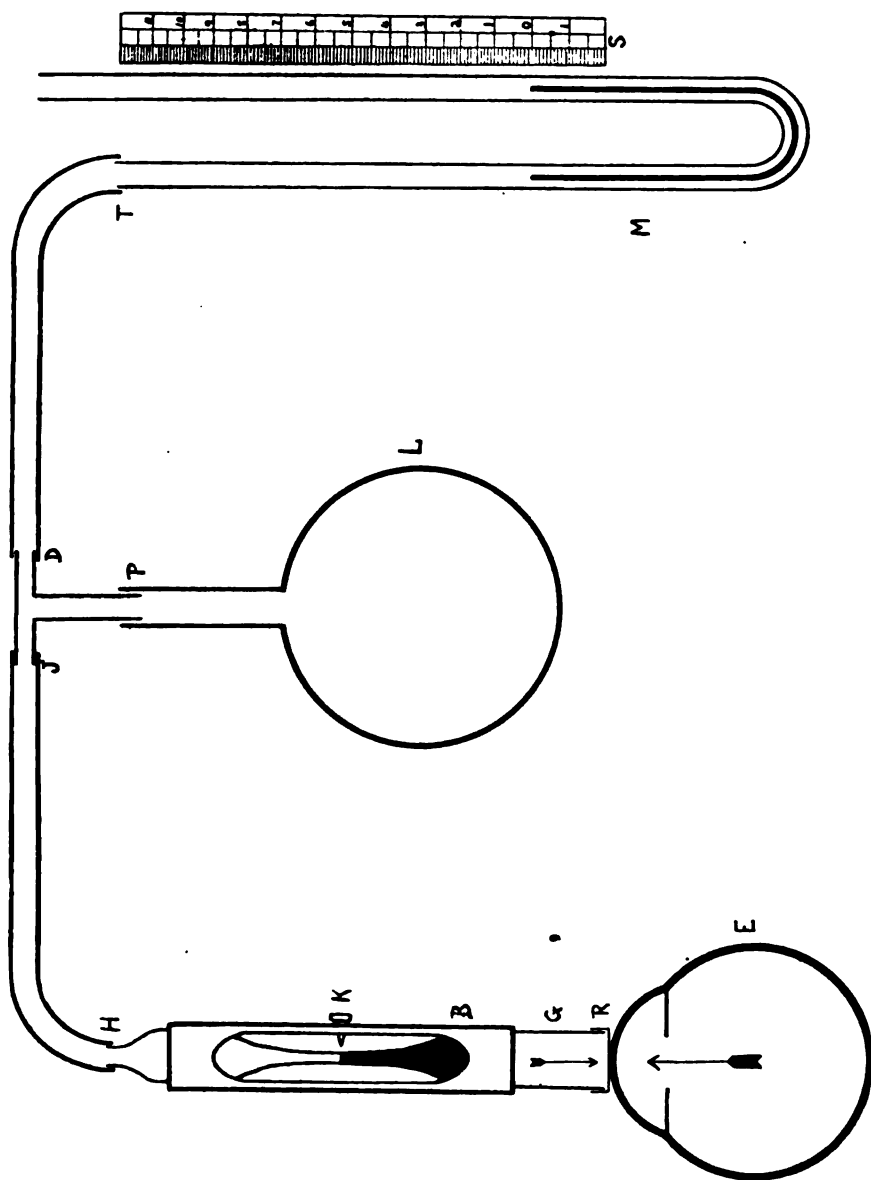
on empirical scales. If comparison is desired with intra-ocular manometric determinations, the relations of these scales must be evaluated.

The apparatus which I have devised belongs to the ap-plantation variety and is subject to the same limitations. It is, however, more accurate because applantation can be positively determined. As the readings are made on a mercury manometer the values are absolute,—not relative.

The essential part of the apparatus is a glass tube (G) suitably protected by a fenestrated brass sleeve (B). Two centimeters from one end of the tube (about 6 mm. in diameter) it is drawn down to about 1 mm. diameter and then expands to the original size, again diminishing to 3 or 4 mm. The large end of the tube is covered with a thin rubber diaphragm (R). The upper end (H) is connected by a rubber tube to a mercurial manometer (M). Between the manometer and the instrument already described is a 3 way tube (F) one branch of which leads to a rubber bag (L). The brass sleeve which surrounds the glass tube has a window through which the constricted part of the glass tube can be seen. At the back of the instrument is a sliding knob (K) which moves a pointer in the sleeve.

The method of using is as follows:

- (1) The tube is filled to the lower end of the constricted part of the glass tube with a colored fluid—water.
- (2) Press the end of the instrument against a flat surface and adjust the index so that it marks the top of the fluid in the tube. This adjustment is made to indicate the height of the water in the tube when the diaphragm is a plane.
- (3) Apply the diaphragm to the eye firmly so that the surface of the ocular tissues barely appears to dimple. The curvature of the eye causes the diaphragm to be pushed inward making the fluid rise in the tube. The relative volumes of the tube and its constricted part are such that a small pressure on the diaphragm causes a marked change in the height of the water indicator.
- (4) Press the rubber ball until the level of the fluid in the tube returns to the marker, indicating that the elastic drum has been pushed back to its normal position (a plane), pressing the ocular structures also back to a plane.



A New Applantation Ophthalmometer. (E. B. COBURN, M. D.)

the area of which is equal to that of the end of the tube. The pressure as shown by the manometer will then indicate the ocular tension.

Let E = the ocular pressure; R = the pressure of the elastic drum when pushed from its position by the curvature of the eye; W = the weight of the water indicator; A = the air pressure measured by the mercury manometer. Then, with action and reaction equal and in opposite directions $E = R + W + A$.

The elastic diaphragm exerts a certain pressure when pushed inward by the curvature of the eye. This is very slight as the membrane does not move more than 0.8 mm. even when the diameter of the tube is 7 mm. It can be measured before the water indicator is introduced, by observing the amount of air pressure necessary to produce a similar distension, the curvature of the eye being known.

Before the liquid indicator is used, the drum is in a state of equilibrium in a direction corresponding to the axis of the tube. When the water is added it causes a slight bulging of the diaphragm. The weight of the water may be measured directly, and remembering that the specific gravity of mercury is 13.6 we must subtract from our reading 1 mm. of mercury for every 13.6 mm. of water in the tube. Or, a similar weight of water may be placed in the manometer tube on the registering side to compensate for the water in the other tube. Another method is to note the distension caused by the water, and then remove the water and measure the air pressure necessary to produce a similar bulging. However, corrections for R and W are very small and may be neglected if only relative results are desired. Then, E (tension of the eye) = A (air pressure measured by the manometer).

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THE IMPORT OF OPSONINS IN THE EYE.

FROM THE UNIVERSITY EYE KLINIK AT BONN, UNDER THE
DIRECTORSHIP OF DR. H. KUHN.

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Translated from *Zeitschrift für Augenheilkunde* (April, 1908),
By T. T. BLAISE, M. D., Mason City, Iowa.

In England the opsonic theory has received much recognition in a brief time, due to its discoverer, Dr. Wright.

In Germany these investigations have been almost exclusively opposed until recently, when several German investigators have confirmed the experiments of Wright as well as established in part their practical applicability.

According to Wright, opsonins are substances which exist in the normal human blood possessing certain properties that affect bacteria in such manner that they can be consumed by the polynuclear leucocytes. The opsonic property of the serum is a specific one, inasmuch as for each bacterium subject to phagocytosis, a separate opsonin exists in the blood. The variety of opsonin properties in the blood is accordingly very great. Continued temperature elevation to 58° destroys the existing opsonins in the normal blood, but by immunization of the organism, the opsonic power is increased for that specific bacterium.

Observing that upon vaccination with dead bacteria the opsonic power of the serum increases, and thereby effects a more rapid recovery of the infection, the efforts to build up this method of treatment on a systematic scale have been augmented, and it would seem in many cases with success.

Since infectious diseases play an important role in ophthalmology, it would seem fit that ophthalmologists should devote attention to the opsonic theory.

However, before we enter upon therapeutic experiments according to Dr. Wright's methods, studying the behavior

of the phagocytosis following immunization, it is necessary that we first ascertain clearly what bearing the opsonins in the normal blood have on the eye.

The cardinal question is this: Do the opsonic substances, found in the blood of non-immunized humans and animals, pass into the conjunctival secretions and into the non-vascular parts of the eye (cornea, aqueous and vitreous humors and lens), and if so, under what conditions?

To my knowledge only Schneider has instituted investigations along this line* which show that the aqueous humor withdrawn the second time affected typhus bacilli in the reagent glass in such manner that the leucocytes took up a large number of the bacilli, whereas the first obtained aqueous excited only a slight phagocytosis. Römer has further called attention to the action the opsonins exert upon the pneumococci, to which I shall refer later in this report.

Furthermore, as is the case in all other reactions, so in this investigation, much attention must be given to apparently small details.

And if the results of those who are experimentally engaged in Wright's theory are at times different, it can in part be attributed to the difference of method employed.

Even the method and manner in which the leucocytes are prepared play an important role. Because it is evident that their vitality must not be reduced, if we expect them to consume bacteria when in the test tube.

For this reason the leucocytes must be free from all bacterial toxins and other poisonous substances. The pus must also be fresh, because the leucocytes contained in it undergo a rapid alteration of their physiological properties, and in such condition can not take up the bacteria.

Likewise the clumping together of the white blood corpuscles should be avoided, for they should be evenly distributed. Finally, caution should be exercised that they are freed from all serous elements with which they are more or less naturally intermixed. All of these technical difficulties I have, I believe, overcome in a reasonable degree, having followed the advice of Prof. Kruse of Bonn, and in the following manner:

*Münch. med. Wochenschrift, 1903, p. 146.

Three ccm. of a repeatedly boiled solution emulsion aleuronat, prepared in a water bath, were injected into the peritoneum of a guinea pig. After twenty hours the animal was killed by extraction of the blood. By means of washing out the cavity with a physiological salt solution, a murky fluid was obtained, containing various sized flakes of exudate. All serous constituents were removed by repeated washing with salt solution. The settled leucocytes at the bottom of the reagent glass, were, after suspension in a few drops of salt solution, drawn into a pipette and by drops placed into serum tubes.

In this manner I obtained guinea pig leucocytes possessing the property necessary for the demonstration of opsonins in the reagent glass.

However, for the completion of the experiments, I deemed it necessary to also obtain human leucocytes, which I shall explain more in detail when I speak of my separate investigations.

The experiments were then executed in the following manner: To one drop of leucocytes was added in quick succession one drop of a twenty-four hour saline-agar or ascetic-agar culture emulsion of the selected bacteria, together with two drops of the fluid which was to be tested as to its opsonic properties (aqueous humor, corpus vitreum, etc.). The mixtures were then vigorously shaken in order to effect an equal distribution, and were placed in the culture oven for about one and one-half hours at a temperature of 37°. Cover-glass preparations were then made in order to ascertain in what degree the leucocytes had taken up the bacteria.

Various kinds of bacteria were employed in this investigation, but preferably those which are etiological factors in the diseases of the eye; e. g., diplobacilli Morax-Axenfeld, staphylococcus albus, streptococci and pneumococci. I also used dysentery bacilli, since, according to Prof. Kruse's investigations, these are easily phagocytised.

I. Opsonins of the Conjunctiva.

I have already in a former article (No. 5, 1906, this periodical), briefly touched upon the question whether the opsonic substances of the normal blood enter into the secre-

tions of the conjunctiva. I, at that time, drew the conclusion that with the bacillus of dysentery, under the influence of blennorrhoeic secretions of the conjunctiva, a decided phagocytosis could be proven, while this, apparently, was not the case with the diplobacillus Morax-Axenfeld. At that time my investigation was very brief, but I later entered upon a systematic procedure of the same.

This result showed that the diplobacilli as well as the dysentery bacilli were so affected by the blennorrhoeal secretions of the conjunctiva, that they were consumed by the leucocytes contained in that secretion. If one employs quite fresh and thin-fluid gonorrheal secretion, one can observe numerous cells loaded with diplobacilli. In some instances, those leucocytes of the gonorrheal secretion which already contain numerous gonococci, take up in addition also many diplobacilli. However, if the secretion has become somewhat thickened, then a phagocytosis is scarcely observable. The more profuse the discharge, the clearer can the opsonic effect be observed in the reagent glass. Heating the secretion for half an hour to 58° causes the disappearance of the thermabile substances of the opsonin entirely, i. e., the opsonic power is no greater then, than that of the physiological NaCl solution.

For comparison I used the secretions from conjunctivitis caused by the diplobacilli, pneumococci and the Koch-Weeks bacilli respectively, but in neither case could a phagocytosis be established. The reason, in my opinion, is that the secretions of these conjunctivites have to an extent but sparing opsonic substances contained in the serum. Especially is this the case in conjunctivitis of the diplobacilli where we have a scant excretory product as a rule, and the inflammation is not intense. The lack of phagocytosis is in part due to the fact that the leucocytes adhere in clumps to the fibrin particles, so that they cannot come in close contact with the added microorganisms. Furthermore it is to be observed that on account of the large quantity of bacteria in the secretions, as is the case in the Koch-Weeks bacillus conjunctivitis, the opsonin disappears from the secretion on account of combining with the bacteria. In conclusion it is to be noted, that the leucocytes, on account of the toxin of the conjunctival bacteria, become rap-

idly weakened to such a degree, that notwithstanding the presence of opsonins in the reagent glass, their power of consuming microorganisms is thus sacrificed.

The same as the opsonic action can be shown in the blennorrheal conjunctival secretions of diplobacilli and dysentery bacilli, so can it also be observed in these secretions caused by streptococci, pneumococci and staphylococci, although in the former phagocytosis is more easily established.

That the leucocytes are not alone capable of taking up the microorganisms of the conjunctival secretions, but that they need the co-action of the liquid, serous constituents of the products of the secretions, can be well demonstrated by the following experiments:

After washing the gonorrheal secretions repeatedly with a physiological NaCl solution by energetic agitation, the same is centrifuged for two or three minutes. In this manner all serum constituents are removed. If now to one drop of these washed blennorrheal leucocytes is added two drops of NaCl solution, and one drop of an emulsion of pneumococci, diplobacilli, streptococci, staphylococci, or dysentery bacilli, then there can be observed only a slight and scattered phagocytosis, but, if now two drops of active serum are added in place of the two drops of salt solution, then the number of phagocytes increases materially.

Likewise will the addition of liquid constituents of the gonorrheal conjunctival secretions under the same conditions induce a more marked phagocytosis, than will the adding of salt solution.

With the leucocytes of the lower animals this can also be shown. I employed leucocytes of the guinea pig, which I obtained, as above stated, by inducing an aseptic peritonitis by means of aleuronat injections. When to these I now added thoroughly washed diplobacilli, streptococci, etc., with two drops of the liquid conjunctival secretions, then there could be observed after a quarter or half hour remaining in the culture oven, a much more active phagocytosis than when, in place of the secretory conjunctival products, I added two drops of the salt solution.

These experiments teach accordingly that the opsonic substances of the normal blood pass into the gonorrheal secretions of the conjunctiva.

It can be observed, e. g., in a Koch-Weeks bacillus conjunctivitis, which is generally of an acute character, that many of the leucocytes of the secretions are loaded with these bacilli, a certain sign that the opsonins which have passed from the blood into the secretions have aided in the process.

The question now forces itself upon us, whether, after recovery of the disease of acute conjunctivitis, the opsonic index increases for that specific disease germ. For with the increase of the germs in the conjunctival secretions, and in the inflamed tissues there is doubtless a degree of active immunization noticeable.

Experimentation herein is, however, beset with too serious technical difficulties in order to allow the drawing of safe conclusions from the results. Above all do the secretions of conjunctivites nearing the stage of recovery assume too tenacious a consistency rendering them ill-fitted for opsonic experimentation.

It is still to be observed that the tears and the normal conjunctival secretions exhibit no opsonic power, but are in their behavior exactly like the normal salt solution.

In conclusion herewith, I wish to report briefly in regard to the experiments which I conducted in the same manner with the pus from the lacrimal sac.

My experiments revealed that with this, as compared with the control experiments with salt solution, an increase in phagocytosis could never be observed.

For this, several causes may be assigned. Either the lacrimal sac contains no opsonins, or the leucocytes contained in the pus are not adapted for such experiments. However, both factors may be taken into consideration.

The first point in question was rendered clear by the fact that I freed the pus from the lacrimal sac of all cell substances by centrifuging and from the liquid remaining above I mixed two drops with guinea pig leucocytes and the bacteria in question (diplobacilli, streptococci, pneumococci, etc.). The result was that the liquid products of the lacrimal pus revealed no higher degree of phagocytosis than did the normal salt solution.

This becomes clear if we consider the fact that the secretions of the tear sac contain much mucus and lacrimal fluid,

both of which, as can be easily shown, contain no opsonins. If, however, during a severe, acute dacryocysto-blennorrhea opsonic substances should pass from the blood into the tear secretions, which may reasonably be assumed, it seems plausible that the numerous bacteria in the pus so effectually reduce these opsonic substances in power that their further action in the reagent glass is not observable.

The second point in question, as to whether the leucocytes in the pus from the tear sac still possess the power to consume microorganisms, I approached in the following manner: After removal of all fluid constituents, I added to them the active serum from the human or guinea pig and also the microorganisms in question. In no case could I observe a phagocytosis worth mentioning. These leucocytes were accordingly powerless to take up bacteria.

To an extent this may be due to the extreme bacterial nature of the lacrimal pus, which exerts a disabling influence upon the leucocytes, although it is doubtless true, that the leucocytes contained in the stagnant secretions of the sac are too old and degenerated to perform the function of bacterial consumption, even though they have not been damaged by the microorganisms.

II. Opsonins in the Aqueous Humor.

The experiments with aqueous humor were carried out in the same manner as those with the conjunctival secretions, employing leucocytes from the human and also from the guinea pig. The manifold variation of the experiments revealed first, that first aqueous humor obtained by means of puncture from the eye of a rabbit induced no more active phagocytosis with dysentery bacilli, diplobacilli, streptococci, pneumococci and staphylococci, than did the physiological salt solution. But the second aqueous humor, which was obtained within a few minutes after the first, the anterior chamber having refilled, behaved quite otherwise. This acted upon the bacteria as well when washed guinea pig leucocytes were used as with the human leucocytes taken from the blennorrhoeal conjunctival secretions freed from all serum substances, inducing a marked phagocytosis. The longer the delay between consecutive tapping of the aqueous, the weaker was its opsonic effect. After

a duration of from four to six hours following the first puncture, the second humor showed no more opsonic effect. A numerously repeated puncture of the anterior chamber, resulted in no stronger passage of opsonins into the aqueous humor than did a single puncture.

Puncture of the vitreous chamber imparted likewise a higher opsonic power to the aqueous humor, and increased in proportion as more vitreous was punctured. In this case, too, the opsonic substances disappeared from the aqueous after a few hours, but generally remained longer than after puncture of the anterior chamber.

Inflammatory irritation likewise facilitated the passing of opsonins into the aqueous humor, increasing with the intensity of the inflammation. This remained the same whether the inflammation involved the cornea, the vitreous or the aqueous humor. When the irritated condition was slight, as, e. g., in the stage of a *subsiding inflammation*, or during a chronic inflammation of the deeper parts of the ball, opsonins could not be observed with certainty in the aqueous humor.

Subconjunctival injections of concentrated salt solution yielded decidedly less opsonins in the aqueous humor than inflammatory irritation.

Aqueous humor which was extracted about four hours after the subconjunctival injection of 1 ccm. of a ten per cent. salt solution, always clearly excited a phagocytosis. The passing of the opsonin into the aqueous in this case was always slower than after paracentesis of the anterior chamber; nor was the effect in all the experiments uniform. This is explained by the fact that eyes vary in reaction after subconjunctival injections. Outside of the quantity and the concentration of the salt solution, the rapidity of the absorption here also had its bearing.

A *physiological* salt solution in subconjunctival application does not heighten the content of opsonins in the aqueous humor. If, however, the same is injected into the cornea, intralamellar, an increase of opsonic power can not be denied. This may be doubtless explained by the fact, that in the latter procedure a more extensive tissue lesion occurs as well as a severer irritation than with the injection under the loose and elastic conjunctiva bulbi..

The opsonic power of the aqueous humor remains entirely unaffected by hyperemia, though this be caused by means of cupping the eye directly, or by application of a compress around the neck.

In conclusion it might be mentioned that the opsonins of the aqueous, as well as those of the conjunctival secretion, are destroyed by heating to 58 degrees for one-half hour.

All these experiments so far mentioned were made with the aqueous humor of rabbits.

But I also had opportunity to conduct several experiments with *human* aqueous with convincing results. I obtained the same from an eye affected with *ulcus serpens*, in which paracentesis after Saemisch was performed. The aqueous humor escaping from the eye following keratotomy, as is well known, congeals rapidly. It can thus be removed in flakes from the conjunctival sac. It is better, however, to draw it into a pipette from the inner canthus immediately after its escape from the anterior chamber, and let it coagulate in the reagent glass. After removal of the congealed products it can easily be tested as to its opsonic properties. It thus revealed a very high opsonic power for dysentery bacilli, staphylococci, pneumococci, streptococci and diplobacilli, although somewhat below that of the blood serum of the same individual.

The aqueous humor obtained the *following day* after re-opening the puncture also revealed opsonic properties in the reagent glass, although the action was somewhat less pronounced; but when on the fourth day the aqueous was withdrawn again from the puncture the same induced scarcely a stronger phagocytosis than a physiological salt solution.

But the clinical course of the ulcer would warrant this, since its progressing margin had abated and become free from pneumococci on the day following the puncture. On the fourth day the irritable condition of the eye had materially decreased. According to this, the opsonic content of the aqueous humor of the human eye depends also *decidedly upon the intensity of the inflammation*. The more violent the irritating condition, the more abundant do the opsonins pass into the aqueous humor.

From the nature of the aqueous after puncture it may generally be concluded in a measure whether it contains the opsonins of the normal blood serum, because its coagulability is an unmistakable sign thereof.

From the disappearance of the coagulation of the aqueous, evidence may be drawn as to the intensity of the existing inflammation. I might mention in this connection Saemisch's experience, showing that the coagulable products in the aqueous humor after reopening the incised ulcer, are a constant indication that the ulcer process has not yet abated, even if clinically no progress can be observed. Only when the escaping aqueous humor does no more coagulate, has the danger definitely subsided, and then, of course, the necessity of reopening the incision has passed.

III. The Opsonin of the Vitreous Body.

The vitreous body of the normal eye of the rabbit contains no opsonins for the bacteria mentioned. No opsonic substances can be discerned in the fluids of the vitreous obtained several hours after the puncture. However, if the vitreous body be punctured two or more days in succession, then the regenerated vitreous will produce a much livelier phagocytosis than does a physiological salt solution. Heating it to 58 degrees for half an hour will again destroy this quality.

This then shows, that the opsonins pass only *slowly* after puncture, from the blood into the vitreous. But also the disappearance of them from the vitreous occurs much slower than it does with the aqueous humor. While the latter within a few hours after the paracentesis of the anterior chamber assumes its normal condition as regards opsonic contents, the opsonins of the corpus vitreum remain for several days.

Paracentesis of the anterior chamber does not affect the opsonic properties of the vitreous at all. Even after numerous repetitions of the same I could not derive a stronger phagocytosis from the fluids of the vitreous humor. A *subconjunctival injection* of one ccm. of a ten per cent. salt solution likewise had no effect in this regard. Also a hyperemia of several hours induced by compression around the

neck, as well as a severe aspiration of the bulb for one-half hour by means of a cupping glass did not induce the passage of opsonic substances into the normal vitreous.

Inflammatory irritation behaved otherwise.

When the inflammation was located in the cornea or in the anterior chamber, I also failed to observe any opsonic effect in the vitreous, nor even then when the inflammation was very severe. But when the vitreous body itself was inflamed, then opsonins appeared in it, provided, the inflammation was not of an intensely purulent character, nor overloaded with bacteria.

If I injected, e. g., a dead dysentery-bouillon-culture freed from bacteria, into the vitreous body of a rabbit, a strong inflammation ensued the next day. The vitreous, now more liquid, could easily be taken up with a Pravaz syringe, and after removing from it all coagulum which appeared in it the same as in the inflamed aqueous humor after puncture, could now be easily tested for opsonin. It revealed a heightened phagocytosis not only for dysentery bacilli, but also for all other bacteria.

But when I injected a virulent staphylococcus culture into the vitreous, then under rapid increase of the micro-organism, a heavy inflammation ensued which resulted in a rapid suppuration of the entire vitreous body. In this case, using the liquid part of the vitreous after freeing it by centrifuging from leucocytes and bacteria, with the washed leucocytes of the guinea pig, I could at most confirm only a sparing opsonic effect. Nor was there in the preparations made from the vitreous pus any phagocytosis noticeable of the staphylococci contained therein.

But the reason for this lay not alone in the scarcity of opsonins, but the pus corpuscles themselves had sacrificed their properties for phagocytosis. This was confirmed by the fact that upon the addition of opsonized serum, no phagocytosis appeared. Only here and there were a few scattered white blood corpuscle loaded with bacteria, while most of the leucocytes on account of degenerative changes were free from bacteria.

I observed exactly the same behavior of vitreous pus from a case of panophthalmitis of the *human eye*, caused by pneumococci. An intracellular deposit of the exciting germ could not be noticed in this pus.

This, as was the case in the analogous experiments, was due in part to the lack of opsonins, and partly to the degeneration of the leucocytes.

The scarcity of the opsonin is of course explained by the fact that the numerous bacteria of the vitreous pus rapidly exhaust the same, while the incapacity of the leucocytes is due to their early deterioration from the poisonous effect of the bacteria.

I also had repeated opportunities to examine the *normal* vitreous of the *human eye*, these eyes having been enucleated on account of trauma. In no case could I observe opsonic substances in the vitreous fluids aspirated from the eye by means of a syringe.

IV. The Opsonins of the Lens and the Cornea.

While the conjunctival secretions, the aqueous humor and the vitreous body are well adapted for experimentation regarding their opsonic properties, on account of their fluid nature, the nature of the cornea and the lens render this decidedly more difficult.

With the lens I conducted my investigations by triturating it with a small quantity of NaCl solution to such consistency as could be sucked up into a pipette and dispensed in drops.

It was thus revealed that neither the *normal* nor the *inflamed* lens from the eye of the rabbit contained any opsonic substance. Whether the inflammation existed in the vitreous or in the aqueous humor and no matter of how severe and irritable form, no opsonins from the blood could be discovered in the lens.

Nor could it be expected that such means of nonreactionary character like the subconjunctival injection of a concentrated salt solution, or induced hyperemia would effect a passage of opsonins into the lens.

So, likewise is the cataractous lens of the human eye, as revealed in two cases (the lens having been removed in the capsule), free from opsonin.

In all these experiments it is necessary that the lens be cleansed from adhering aqueous humor with a NaCl solution, since, as above enumerated, the humor contains opsonins not only during an inflammatory irritation, but also

in noninflammatory conditions when after the evacuation of the first humor the second is being replaced. For the sake of precaution, the capsule was properly removed and only the real lens substance was employed in the experiments.

Exact experiments, according to my opinion, can not be conducted with the *cornea*, because there can neither be enough fluid expressed from it necessary for the opsonic test, nor can it be resolved into a paste,—even the scraping of the resisting lamellae was only partly successful. To investigate the bactericidal substance of the cornea, I have consequently restricted myself to the observation of the phagocytosis before and after paracentesis of the *ulcus serpens* in the human eye, making comparisons. Such investigations on the living, human eye, are without doubt of higher value than all experiments with the reagent glass and those on animals.

This revealed that in many cases after keratotomy, I obtained from the inflamed nucleus, preparations in which phagocytosis was very pronounced, while before the puncture the same was slight or even not noticeable.

Of course, the phenomenon of phagocytosis did not follow in each operation. Only when the latter is accompanied with success does one obtain convincing pictures, because, in such case alone do sufficient quantities of opsonic substances pass into the cornea.

This may occur in various manners; first, by the passage of the active substance, from albuminous and opsonic aqueous humor into the inflamed and incised corneal structures, or, again, by an invasion of opsonic substances from the capillary loops of the corneo-sclerotic junction into the corneal parenchyma.

The latter mode of transmigration, as before indicated, is apparently the actual one. For, since immune bodies of the blood after immunization of the organism pass into the inflamed cornea, without opening the anterior chamber, as Roemer's experiments without doubt show (*diphtheria* and *pneumococci* serum), then this must occur in all likelihood in case of the normal protective substances of the blood. But the quantity of the same is generally too small to reach the infected focus in time and effectually. Only after in-

cision of the ulcer are they carried over into the cornea through the continued hyperemia of the entire structure of the ball, as also in a high degree from the nearer approaching vessels to the cornea, in a sufficient degree to disable the disease factors, partially through direct destruction of the same, and partially because they excite an increased phagocytosis. Since, however, the highly virulent pneumococci germs, as Roemer emphasises (*Heidelberg Ophth. Ges.*, 1907, p. 39), are not phagocytizable, but are protected by the capsule, it is apparent, that the opsonins of the normal serum develop only then an effectual activity in the pneumococci ulcer, after the virulence of the pneumococci has suffered from the bactericidal substances of the blood. Those examples of less virulence hardly fall under this category, but may fall victims to the direct action of the opsonins.

How long after the procedure of paracentesis one should wait before making the preparations for the test of increased phagocytosis, can not be definitely stated. Here extraordinary vacillations appear. In one case I could observe after three hours numerous phagocytes, while in others only after eight hours and later. Indeed, there are instances in which the phagocytosis following in a few hours after the keratotomy, can in the course of a few hours be no longer observed. These belong to those cases in which the opsonic action was only of passing nature, and in which clinically, after the keratotomy, the progress of the ulcer was not arrested. In these cases the reconstructive process is only a complete one after one or more repetitions of the puncture. Finally, there are cases in which there is neither a bactericidal nor an opsonic action noticeable after keratotomy, because the general organism, on account of enfeeblement due to recent disease or any other causes, does not contain these substances in sufficient quantity. That in such cases keratotomy is not followed by the desired result is evident, but such cases are, nevertheless, very scarce. If only the desired patience is exercised with the determination to reopen the puncture very frequently, even twenty times consecutively, at intermissions of from a half day to a day, as we have done in some cases without injury, then the scanty opsonic and bactericidal substances of the reduced organism will prove efficient to bring the ulcer to a healing state and rescue the eye.

Also in the cases in which the ulcer soon after puncture clears up, I did not each time observe a phagocytosis. This is due to the fact that the entire process occurs in that portion of the corneal tissues which possesses restitutorial power, and not in the necrosed masses of the ulcer. The chances for discerning numerous phagocytes in the preparation are consequently only then facilitated when the upper portions of the ulcer are scraped off as much as possible, and then obtain by scraping from the underlying non-necrosed tissue the material to be used. This is, of course, a rather severe procedure, but under the always salutary effect of the puncture it is easily borne.

That the leucocytes in the easily removable necrosed masses of the *ulcus serpens* do no more possess the power of consuming pneumococci can be easily shown, by putting together into a reagent glass some of this leucocyte-material with fresh bacteria and an opsonic fluid (serum or second aqueous humor).

No phagocytosis can here be observed, whereas live guinea pig leucocytes under these same conditions show an energetic consuming power.

Roemer (*Heidelberg. Ophth. Ges.*, 1907, p. 31) has also pointed out the fact that only fresh and undeteriorated leucocytes possess the power to take up pneumococci.

Final Observations.

I. Opsonins existing in the blood of non-immunized humans and animals, are, under normal conditions, not found in the conjunctival secretions and other non-vascular parts (cornea, aqueous humor, lens and vitreous body) of the eye.

II. During inflammation of the conjunctiva the opsonins pass into the conjunctival secretions, increasing in quantity as the inflammation and the secretions increase in activity, while the lacrimal fluids never revealed an opsonic effect.

III. In the secretions of chronic dacryocysto-blennorrhea there are generally no opsonins traceable.

IV. After puncture of the anterior chamber, opsonic substances pass into the inflamed cornea in augmented measure, as is shown after keratotomy in *ulcus serpens*.

V. After puncture of the anterior chamber of a non-irritated eye, opsonins can be revealed in the so-called regenerated second aqueous humor, however, disappearing again after few hours.

VI. Likewise do inflamed processes of the cornea, the anterior chamber and the vitreous body, as well as sub-conjunctival injections of a concentrated NaCl solution induce the passage of opsonins into the anterior chamber, while hyperemia induced by means of compression about the neck, or by suction with cupping glass, fails to accomplish this.

VII. Opsonins pass into the vitreous body from the normal blood, after repeated puncture of the vitreous chamber, but they disappear mostly after a few days entirely.

VIII. Inflammations only then facilitate the passage of opsonic substances into the vitreous body when the inflammation exists in that body itself, while inflammations of the anterior parts of the eye do not augment the opsonic power of the vitreous. Nor does the vitreous body take on opsonins after conjunctival injections of concentrated salt solutions, nor after induced hyperemia by compression of the neck or cupping.

IX. No opsonins can be observed in the lens, even during the most intense inflammations in the closest approximated parts.

X. For the demonstration of phagocytosis, the leucocytes, taken from the fresh, thinly liquid, gonorrheal, conjunctival secretions, are very efficacious, while the leucocytes from the dacryocysto-blennorrhea, those of the vitreous body, and those of the necrotic debris of a corneal ulcer, as a rule, are too degenerated to take up microorganisms.

The passage of opsonins from the blood into the conjunctival secretions and into the non-vascular tissues and fluids of the eye occurs accordingly under exactly the same conditions under which the bactericidal substances are transposed.

The investigations of the latter I have already reported (*v. Graefe's Arch. f. Ophth.*, lxx Bd., H. 2, S. 267, and *Zeitschr. f. Augenheilkunde*, xvii Bd., H. 5, S. 300). But I have continued the same since, chiefly by employing human material, always confirming the results of my former work.

The lens alone I did not include at that time in the body of my report. For the sake of completeness I shall therefore now add that I never found bactericidal substances in the lens-body. Even during heavy inflammations of the anterior chamber and the vitreous body the lens did not acquire any bactericidal properties, on the contrary, under the influence of the rich albuminous lens paste in the reagent glass, an enormous increase of bacteria could be substantiated.

Opsonin experiments are in general more complicated than reagent glass bactericidal tests, because small and unintentional variations may vary the results. Even in the beginning one comes in contact with difficulties and contradictions at every turn.

I found, e. g., incidentally that the experiments with one rabbit gave entirely different results than with another; later, however, it developed that in this case one of the animals was sick. It can be readily understood that under the influence of severe disease and general nutritive disturbances, the opsonic contents of the organism must be vacillating. But also in healthy animals individual differences exist.

That the manner in which the leucocytes are prepared for the experiments is of significant importance, I have already mentioned in the beginning. So the washing and centrifuging of the peritoneal pus should not be continued more than a few minutes, lest the leucocytes be harmed. On the other hand, however, these measures must be executed so perfectly that all the fluid products of the exudate which in themselves may possess opsonic power, are removed.

The virulence of the bacteria are also not indifferent in these experiments, for it is a fact of high import that the virulent species develop a phagocytosis with more difficulty, as Roemer found to be the case with pneumococci.

In conclusion, it may be pointed out that the opsonic power differs in degrees in the various species of bacteria. The diplobacillus Morax-Axenfeld, e. g., is easily phagocytized, so that even under the influence of a physiological salt solution a phagocytosis can occur. In such cases, our calculation regarding the action of the fluid which is to be

tested for its opsonin contents should only be made for a brief period, say, from one-fourth to one-half hour, if one desires to distinguish materially between it and the action of the salt solution; because these opsonin holding fluids excite an energetic phagocytosis in most cases from the beginning, while the salt solution requires a much longer time. After several hours a distinction in degree of activity is scarcely possible.

With other bacteria, such as pneumococci and streptococci, I obtained at times within one-fourth hour good specimens which illustrated the opsonic action in a convincing manner, while again in cases, the same developed significantly only after a lapse of from one to one and a half hours.

Proceeding in this manner methodically and in divers manners, one quickly arrives at the conviction that the transpassage of opsonins into the conjunctival secretions, and into the non-vascular structures of the eye follows distinct laws, whose aim and importance in the healing process of infectious eye diseases can not be mistaken.

To my esteemed Chef and Counsellor Herrn Kuhnt I am deeply indebted for the interest proffered in these investigations.

REPORT OF A CASE SHOWING MANIFEST CANAL OF CLOQUET.

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The hyaloid canal, or canal of Cloquet, is a tubular channel, beginning at the optic disk and extending through the vitreous toward the posterior pole of the lens, near which it terminates. It is from one to two millimeters in diameter, its beginning at the disk being slightly larger, the *area-Martegiani*. In fetal life the hyaloid artery passes through it to the posterior surface of the lens. Before, or shortly after birth the artery disappears, sometimes leaving a thread-like strand that can be seen with the ophthalmoscope in adult life, as remains of the hyaloid artery. The canal of Cloquet is present in the adult eye, but as its walls are transparent and it contains vitreous it is, ordinarily, invisible ophthalmoscopically.

Manifest canal of Cloquet is of less frequent occurrence than persistent hyaloid artery. Schoebl, in the chapter on Diseases of the Retina, in the *Norris and Oliver System*, mentions "five classic cases" seen in his practice, in upward of one hundred and fifty thousand patients. He also cites cases by Stilling, Flarer, and two by de Wecker. In 1876 Manz demonstrated the condition anatomically. Fuchs, in writing on vitreous opacities, describes persistent hyaloid artery and says: "At times, in place of the thread, a broader, tube-like structure is seen, which projects, from behind forward, in the axis of the vitreous. This is the hyaloid canal (also called the canal of Cloquet), which is seen on ophthalmoscopic examination, because of the abnormal development of its walls."

The few cases of this condition that I have been able to find in the literature, at command, and the distortion and shrunken appearance of the canal in the illustrations found, have prompted me to report the following case, wherein the canal has retained its dimensions and, approximately, its normal course throughout the vitreous.

October, 1906. A. W., female, age six years, consulted

me for the correction of a convergent strabismus, which had developed about six months previously. At first the deviation was noticeable only in near vision, as in reading, the eyes assuming, apparently, their normal positions in distant vision. Beside occasional frontal and vertical headaches, there were no other subjective symptoms. The general health had always been good, except for measles when two years of age, and pertussis two years later. Family history was good.

On examination the conjunctivae both eyes were clear. O. D. Iris active to light and accommodation. O. S. Iris was active to stimuli, except in the lower nasal quadrant, which seemed inactive and retracted. Convergent strabismus, O. D. fixing eye, O. S. convergent 16° (Worth deviationmeter). O. D. V. 6/9, O. S. V. 6/40.

The patient was very restless, and satisfactory ophthalmoscopic examination could not be made, especially as the pupils were small. Under atropin: O. D. pupil fully and evenly dilated. Media clear. Disk oval, long axis 110. Connective tissue ring all around. Retinal reflexes marked. No gross changes noted. H + 2 D.

O. S. Pupil irregularly dilated, the lower nasal quadrant being bound down by posterior synechia, making a trough-like depression in the iris surface. Media clear. Disk edges blurred. Superior retinal vessels rather tortuous, the veins being full and darker than in O. D. Extending from the disk into the temporal fundus, involving the macula and about 2 D.d. beyond, there was an edematous swelling of the retina, greyish in color. Extending from the surface of the disk forward, downward, and a little to the temporal side of the median line through the vitreous, there was a manifest canal of Cloquet, about $3/4$ D.d. broad, and tapering very slightly as it left the disk, maintaining a cylindrical shape throughout its course in the vitreous. It is translucent in appearance, being about the same color as the disk, and having several small blood vessels on its surface. The inferior retinal vessels curve around its base, slightly anterior to the surface of the disk, and are lost to view for about $1\frac{1}{2}$ D.d., where they are seen coming from beneath the canal, on the retina. The nasal vessels give off no visible branches for a considerable distance. The hyaloid

canal can be followed through the vitreous into the anterior part where it is lost to view behind the iris.

The inflammation of the retina slowly subsided, and after the eye was quiet, the case was refracted, by retinoscopy, and these lenses prescribed:

O. D. + 1.25 Ds. \ominus + 0.50 Dc. X 90° V. = 6/7.5.

O. S. + 2 Ds. = V. = 6/40.

The deviation of O. S. was not apparent, and the patient continued to do well until April, 1908, previous to which



Canal of Cloquet. Old Chorioretinitis. (A. C. MAIRSCH, M. D.)

she had an attack of "grip", followed by O. S. again converging.

O. D. V. c. glasses = 6/7.5. O. S. V. c. glasses = 6/40.

Ophthalmoscopic examination showed no change in O. D. In O. S. in the region of the old retinitis there were the pigment deposits and the golden, glistening spots outlined with pigment, as shown in the sketch.

The sketch was particularly difficult to make, owing to

the lack of fixation, due to the strabismus, and I wish to acknowledge my indebtedness to Mrs. H. R. Rudy, who was so painstaking in the making of it. It is very difficult, if not quite impossible, to give the impression of relief with which the canal stands out, and the translucency of it throughout its course, nor can the golden, glistening appearance of the retinal spots be pictured as they are seen in the eye.

Whether, in the case reported, the vessel that is seen on the canal for a considerable distance, is the hyaloid artery or not, is a question, but it seems to me, coming as it does from the central artery, that it probably is the patulous remains of that vessel.

Among the complications mentioned as accompanying manifest canal of Cloquet, are disseminated chorioiditis, pigmentary degeneration of the retina and posterior polar or capsular cataract. Three of Schoebel's cases were complicated with retinitis pigmentosa. In the case reported the retinitis was the accompanying condition. There was no opacity on the posterior lens capsule.

What it is that causes the canal of Cloquet to become manifest, is a question that has occurred to me since seeing this case. Its walls are, normally, transparent, therefore invisible on examination. Is it not possible that they become thickened by inflammatory changes, and that the conditions which have been mentioned as complications are really the cause of the inflammation of the walls of the hyaloid canal, or that the inflammation extends to them by contiguity?

DISEASES OF THE IRIS AND CILIARY BODY.*

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Acute iritis, or inflammation of the iris, is a not uncommon disease of the eye which may easily result in loss of vision and is met with in all classes of people. In many cases the final result depends greatly on the promptness with which the diagnosis is made in the early stage of the disease, and proper treatment instituted. It must be distinguished from the comparatively innocent conjunctivitis, it should be differentiated from inflammation of the cornea, with which, however, it is frequently associated, and it must never be confounded with glaucoma, because such a mistake will result in the adoption of a line of treatment harmful to the eye. The differential diagnosis usually is not very difficult, yet anyone who can make it with certainty in the early stage of every case possesses diagnostic powers which put to shame those of the ordinary mortal, and it is my purpose to call attention to the diagnostic symptoms with a view to make the differentiation as simple as possible, and also to speak of the etiology and the rational treatment of the disease.

It is well to remember that with few exceptions the appearance of an eye in which the iris is inflamed is the same whatever may be the cause of the inflammation, that usually nothing is visible to give even a faint indication of the etiology in a particular case. The exceptions are characteristic of a few rare forms.

In acute iritis there is pain in the eye, brow and temple which is worse at night and in the early hours of the morning. Although sometimes it is very slight or entirely absent, yet this pain may be classed as a fairly constant symptom and is of service in helping us to form an estimate of the severity of an attack, because its intensity is usually in direct proportion to the severity of the inflammation, so

*Lecture delivered before the students of the Manhattan Eye, Ear and Throat Hospital.

that an increase or mitigation of the one coincides with an exacerbation or subsidence of the other. It is aggravated by any cause which tends to promote activity of the iris, whether by the entrance of light into the eye, or by accommodative efforts in attempts to read, sew, or to use the eyes for any other kind of near work. It is usually increased by cold and soothed by warm applications.

Another symptom is tenderness of the eyeball to pressure. When the ciliary body is not involved in the inflammation this tenderness is not very pronounced, but is commonly greater than in conjunctivitis or keratitis.

A slight degree of photophobia and lachrymation is generally present, in very severe cases it may be very marked, but prominence of these symptoms is apt to indicate an associated inflammation of the cornea. Another constant, though not pathognomonic, symptom of acute iritis is the circumcorneal injection. This is produced by the dilatation and injection of the branches of the anterior ciliary arteries and veins which form a network around the cornea a quarter of an inch or so broad, the finest meshes of which lie very close to the cornea. In mild cases there may be formed only a pinkish zone surrounding the cornea, but with increased intensity of the iritis this zone becomes broader, and in severe cases may be associated with engorgement of the superficial conjunctival vessels, in the worst cases with chemosis. Such a circumcorneal injection does not necessarily indicate the presence of an iritis, it may point to an inflammation or irritation of the cornea, or to inflammation of the deeper parts of the uvea, but when it is present, the condition of the iris should always be carefully and thoroughly investigated. It is not difficult to recognize a circumcorneal injection when it is unassociated with hyperaemia of the conjunctiva, but often it is the case that injections of the superficial and deep vessels co-exist, and the former may obscure the latter to such a degree that a differential diagnosis is a matter of difficulty. A point worth noting is that, except in purulent iritis, there is seldom any swelling or redness of the lids, aside from a little redness confined to the margin of the upper lid.

Another symptom is hyperaemia of the iris, most distinctly visible in the region of the sphincter of the pupil,

where some of the branches of the arteries of the iris form a ring. Sometimes the dilated vessels can be seen with the aid of a magnifying glass, rarely with the naked eye. Sometimes an engorged vessel gives way and an effusion of blood appears in the anterior chamber.

A notable change takes place in the appearance of the iris, it loses its lustre, and its color is more or less changed from its normal hue, so that it is commonly said to look muddy. This is the result of exudation into the aqueous as well as into the iris, and therefore varies according to the nature and amount of the exuded material. The exudation into the iris tissue thickens it slightly and with tolerable uniformity, the only exceptions being in cases of gummatous, tubercular and scrofulous iritis. It also covers the surface of the iris, whence some of it escapes freely into the anterior and posterior chambers, while some on the posterior surface of the iris becomes attached to the anterior capsule of the lens and glues these surfaces together in places. These adhesions are called posterior synechiae. They render the pupil irregular in shape and form the most unerring diagnostic symptoms exhibited by the disease.

The congestion of the iris, together with the irritation of its peripheral nerve filaments, renders the pupil smaller than normal and causes a sluggishness of its movements which furnishes a fairly reliable means of determining whether a doubtful case is one of conjunctivitis alone, or of conjunctivitis associated with iritis. If the eyes are alternately covered and exposed to light, the dilatation and contraction of the pupil will not be as rapid and marked when the action of the iris is thus interfered with.

Vision is interfered with proportionately to the obscuration in the pupil and anterior chamber. When it is much lowered with no evident explanation, such as occlusion of the pupil with lymph, it is very likely that the iritis is complicated by inflammation of other parts of the uveal tract, perhaps with changes in the vitreous, but even when no such complication is present the cloudiness of the cornea and aqueous combine with a change in the refractive condition of the eye to cause a disturbance of the vision.

Such is the clinical picture of an acute iritis. The tension of the eyeball should be tested in all cases; if this is

increased it is an indication of the presence either of glaucoma, primary or secondary, or of serous cyclitis. When the tension is normal, the muddiness of the iris, small pupil and circumcorneal injection usually serve to differentiate an iritis from a conjunctivitis, a scleritis or an episcleritis, while in doubtful cases dilatation of the pupil with a mydriatic will demonstrate the presence or absence of posterior synechiae and so determine whether iritis is present or not. Whether there is any trouble with the cornea or not must be determined by a careful inspection.

The indications for the treatment of iritis as such, can be derived from the symptoms just enumerated and will remain the same whatever the etiology may prove to be in any particular case. The first indication is, that, as the iris is exuding lymph which will form attachments to the anterior capsule of the lens, fill the pupil more or less and obscure the vision to a corresponding degree, the pupil should be dilated and kept in that condition so that the central portion of the anterior capsule of the lens may be affected as little as possible by this exudate; the second is that the newly formed synechiae between the iris and the anterior capsule should be ruptured if possible; the third is that the iris and ciliary muscle should be kept absolutely quiet, because activity of these tissues tends to increase the inflammation; the fourth is to relieve the congestion of the engorged blood vessels of the iris; the fifth is to alleviate the pain. The first three indications are wholly, and the other two partially, met by the instillation of a solution of atropine into the conjunctival sac, the drug which is universally accepted as the best for this purpose. The application of heat aids in reducing the congestion and relieving the pain, but sometimes local abstraction of blood and the use of an anodyne are necessary to meet these indications satisfactorily. In regard to heat Fuchs says: "In violent inflammation moist warm compresses or poultices afford the best results." I have not been able to bring myself to believe that this is true. The pain may be alleviated both by warmth and by a considerable degree of heat, but if the indication to be met is a change in the circulatory condition of the iris, and if the heat is to be applied to meet this indication, it seems to me that it should be so applied as to obtain the secondary contraction of the small blood vessels.

The greater the heat applied, within the limit of scalding or burning, the more marked is the secondary reaction, and the greater the therapeutic effect obtained. This is true not only in theory, but, so far as my small experience goes, it is true in practice. Bathing the eye in the hottest water the patient can bear for at least ten minutes every two or three hours is an effective way of applying heat, and I am accustomed to recommend this even when there is no pain, as it has seemed to me that a more rapid determination of the inflammation may thus sometimes be obtained. When such applications of hot water are insufficient, local abstraction of blood is often of great service. I cannot agree with writers who say "Leeching sometimes has a good effect on the pain, though it has little influence on the course of the inflammation." In selected cases distinct benefit is to be obtained from leeches properly applied. I have repeatedly seen in severe cases of iritis, pupils which could be dilated only partially by atropine and heat, suddenly become widely dilated from the influence of the atropine shortly after a leech had been used, while in the same cases the severity of the pain was abated, sleep obtained and not infrequently the previously obstinate course of the inflammation changed to one leading to recovery. I do not ascribe all this to the abstraction of blood alone; other treatment should always be maintained and the use of the leech is indicated only in bad cases, but I have no doubt of its therapeutic value in those cases even though it may not save every eye. I would like to say a word as to the location where a leech should be applied. Most text-books say "put half a dozen on the temple." Why? The tragus is the right place to put a leech if you wish to control pain in the ear, but not to control pain in the eye, and it is not surprising that observers have found little influence exerted on the course of an iritis by abstraction of blood from the temple. If a single leech is placed on the side of the nose, about a quarter of an inch from the inner canthus, a superficial vein in that location often indicates the proper place, more effect will be obtained on the iritis than from six placed on the temple, at least that is my experience.

If to this treatment is added absolute rest for the eyes and quiet for the whole body, everything possible will have been done in the way of treatment of the iritis itself. An

acute attack, especially if it is the first from which the patient has suffered, will probably recover under such a line of treatment. But should treatment be limited to the attempt to get a particular attack of iritis well without regard to the probable future of the eye or of the patient? If not it is necessary to carefully investigate the etiology of each case. Syphilis is responsible for probably one-half of all cases, usually as a secondary manifestation, though occasionally it is met with in the hereditary form. In hereditary syphilis it generally appears about the age of puberty associated with interstitial keratitis, rarely it is met with in infancy, still more rarely in intra-uterine life. As a secondary symptom of acquired syphilis it occurs in only a small percentage of syphilitics, coming as a rule rather late, after the other symptoms are fading away or have disappeared, but it sometimes appears at an early stage, and it may be, as the first symptom. Some years ago I saw a case of iritis which was the first indication of the specific nature of a lesion of the tonsil, and was followed a day or two later by a well marked eruption.

Usually nothing characteristic of syphilis is to be seen in the eye, and the diagnosis must be obtained from the history and a physical examination of the patient, but a definite characteristic is to be found in a very small proportion of these cases. Yellowish, vascularized nodules, ordinarily called gummata, develop in the iris where they grow slowly and cause little pain or inflammation until rather large. Their vascularity increases as they grow, so that they change in color from yellowish to a dirty brown, a change which is at times of service in differentiating them from tubercles. The great majority of these nodules do not belong to the tertiary period, but to the secondary, and are papules or condylomata rather than gummata. True gummata of the tertiary stage are very rarely met with.

All patients with syphilis should be warned that the iritis is only a manifestation of that disease, and should be urged to submit themselves to a prolonged treatment to ward off future trouble.

Because of the old aphorism, "*omnis syphiliticus mendax*," the truth of which I am not inclined to dispute, it is hardly fair to assume that every person who denies having

contracted syphilis is a liar in the absence of other evidence than the presence of an iritis. Yet we are apt to proceed on exactly this assumption. Twenty years ago I was House Surgeon in one of New York's large hospitals, and under the guidance of an excellent syphilographer. A man had been operated on; the wound did not heal as rapidly as it should; the patient denied that he had ever contracted syphilis; a very thorough physical examination failed to discover a trace of that disease until the pupil had been dilated with a drop of atropine and a posterior synechia revealed. This was considered proof of antecedent syphilis. To-day I doubt that this evidence was proof. That patient had had iritis, but as that was the only symptom which indicated the presence of syphilis found in the course of a skilfully conducted and thorough examination, it seems more rational to say that while the possibility of a syphilitic origin of the inflammation could not be excluded the chances were in favor of a different etiology. Throughout medicine there is a predilection to make syphilis responsible for obscure diseases, and this is as true in the ophthalmological department as in any other. It is easy to avoid the labor of investigation by accepting without question a common ascription of syphilis, which may at times be the result of a hasty generalization, as the cause of certain conditions. When I began the study of diseases of the eye I learned the rule that iritis in a young man was almost always either syphilitic or traumatic, in an old man probably rheumatic. Could a diagnostic rule be simpler? But before long a rheumatic iritis in a young man caused me to question the accuracy of this generalization and the safety of relying upon it. Reliance on such a rule is never safe, but every patient should be subjected to a rigid scrutiny to differentiate the cases due to one cause from those due to another.

All authors are not agreed that syphilis is the most frequent cause of iritis. Berry says, "It is difficult to determine in what proportion these two predisposing causes (rheumatism and syphilis) are accountable for the cases met with, as not only is there probably a very considerable difference in this proportion in different places, but it is by no means easy always to exclude the possibility of a syphi-

litic origin in any particular case. We may say with tolerable certainty, however, that syphilis is seldom responsible for less than ten per cent., or more than fifty per cent., of all the cases, so that on the whole the rheumatic form is decidedly the most common." In the *Münchener medizinische Wochenschrift* for 1900, von Michel states that he found iritis in 84 patients, associated in 31 with tuberculosis, in 29 with nephritis, in 13 with diseases of the circulatory apparatus, in 5 with syphilis, and in 6 with as many other different diseases. The facts as stated in this paper may be correct, but the inferences I would at first be inclined to draw would be misleading. In the histories of the patients who presented a combination of tuberculosis and iritis there is no mention of any other disease either as present or excluded; the same is true of the histories of the patients with nephritis and of all the others. There is no demonstration of a causal relation between the iritis and the associated disease, and it is therefore unnecessary to disprove the inference which may so easily be drawn that among these cases of iritis, tuberculosis was the pre-eminent etiological disease.

Whether we dismiss the doubts engendered in our minds by such authority as to the predominance of syphilis as the causative factor in iritis or not, it remains true that not far from one-half of the cases are dependent on something else, and if we are going to try to produce anything beyond an abatement of the local manifestation of a general trouble we must search for the cause, and it is better to exclude other diseases before accepting syphilis as the cause of the inflammation in any particular case, because it is quite possible for a rheumatic or other form of iritis to occur in persons who have had syphilis.

Most observers agree in considering rheumatism as the disease second in importance in the production of iritis. Fuchs seems to believe affections of the joints to be the only form of rheumatism which is provocative of iritis, but Juler's statement that iritis is most common in the chronic forms of rheumatism seems to agree better with most observations. It certainly occurs in persons subject to indefinite rheumatic pains in the muscles and elsewhere who have never had articular rheumatism or gout. Persons of

middle life and old age are the more frequently affected, but the disease occurs at all ages, though rarely in childhood. Usually there is a history of antecedent, sometimes concurrent, rheumatism, but in other cases there may be no other manifestation of the disease than a marked tendency to iritis on catching cold. The iritis may be monocular or binocular, and may appear with any degree of severity. Juler says it is attended with greater pain than the syphilitic variety, yet I have heard the suggestion made by a specialist of some experience that the rheumatic form was the milder. The only distinctive characteristic of rheumatic iritis is its aptitude to recur. The treatment, in addition to that for the iritis itself, should be the most approved for rheumatism, and the patient should be warned to expect future recurrences.

Gonorrhoeal iritis does not develop as an immediate result of gonorrhoea, but appears when there is a general systematic infection productive of gonorrhoeal rheumatism, and perhaps it might properly be classed as a form of rheumatic iritis. It may recur with each fresh infection of gonorrhoea as well as with every return of the joint trouble whether accompanied by a fresh infection or not. It is possible that if the urethras of every patient with iritis were inspected, gonorrhoea would be found to be more frequently coincident with this inflammation, as Foerster asserts, but even though this should prove true, the fact would be of little pathological importance when we consider the proportion of the male population which has had gonorrhoea together with the proportion of the cases of iritis which is admittedly of luetic origin.

Tubercular iritis is a rare form which presents some marked characteristics. It is generally met with in children. The attack is often preceded by ill health and accompanied by swelling of the lymphatic glands. It begins as an ordinary iritis, with or without associated tuberculosis in other parts of the body, which becomes chronic, while small yellowish tubercles appear in considerable numbers in the tissue of the iris. These may disappear and be replaced from time to time, or may become confluent. Finally they may all disappear and the iritis get well, or the eye may be destroyed. The worst cases, not only in regard to the wel-

fare of the eye but the life of the patient as well, are those in which the tubercles become confluent. Such cases were long known as granulomata of the iris, and were first recognized to be tuberculous by Jacobs of Dublin. Tubercular iritis can be differentiated from the gummatous variety of the syphilitic by the facts that the patients are younger and that the tubercles are usually yellower, though sometimes they have a red, vascular border which makes them resemble gummata. There is no special treatment for this class of cases. Atropine must be relied on to check the inflammation, while every possible effort is made to improve the general nutrition. The problem of preventing a general systemic infection sometimes arises. The excision of an isolated tubercular mass with a portion of the iris, *a la* Terson, can rarely be successful, and the proper treatment when there is danger of systemic infection, particularly when a granuloma threatens to perforate the outer coat of the eye, is enucleation. The presence of the tubercle bacillus in this affection has been demonstrated many times.

Scrofulous iritis is mentioned by some authors. Fuchs says it resembles iritis from hereditary syphilis, occurs in scrofulous children and is characterized by large lardaceous masses. From the descriptions it would seem difficult to differentiate this from tubercular iritis.

Inflammation of the iris is a rare complication in acute infectious diseases, such as influenza, pneumonia and typhoid fever. It is also met with in diabetes and malaria, and has been ascribed to uterine and nasal troubles. There is nothing characteristic about these attacks and the treatment is simply that for the iritis added to that for the primary disease. A purulent iritis has been met with in puerperal septicaemia and pyaemia, but no special treatment is indicated.

Occasionally a case is met with in which the inflammation develops with no indication of a local or constitutional cause. Such a case is called idiopathic. It is usually unilateral, always in adults and most frequently in men. As illustrations I will describe two cases which recently came under my notice. The first patient was a young man who had received a slight injury on the head, not in the region of the eye, during a yachting trip. A week or ten days

later iritis appeared in one eye. Not only was there an emphatic denial of any exposure to the ordinary mode of becoming infected with syphilis, but a physical examination failed to reveal any trace of the presence of that or any other disease. The patient ascribed the inflammation to the slight traumatism on the head several days before, but this explanation seemed hardly probable. Under treatment with atropine the eye recovered in one week. The possibility that this was a rheumatic iritis from catching cold cannot be denied, but the patient showed no other symptoms of a cold. The second patient was a young man whom I saw in Dr. Hepburn's clinic at the Manhattan Eye and Ear Hospital. He had a very obstinate iritis, denied syphilis, presented no stigmata of that disease, was not rheumatic, had none of the diseases I have mentioned, had suffered no traumatism and showed no filariae in his blood. Diabetes insipidus was present. Neither antisyphilitic nor antirheumatic treatment was of avail. Finally the patient was given a good preparation of iron with the result that both the iritis and the diabetes insipidus immediately responded and went on with equal steps to recovery. In this case it certainly appears as if there was some connection between the administration of the iron and the amelioration of the conditions previously present, but no positive conclusions can be drawn from a single case; it can only be recorded and future experience awaited to lighten its obscurities. But it shows that the etiology of iritis is not as yet perfectly understood, possibly indeed investigation may some time reveal that we do not know as much about this subject as we think we do.

An acute iritis or iridocyclitis may mark the onset of a sympathetic ophthalmia, a fact which must be borne in mind when the fellow eye has been injured at a previous time.

Traumatic iritis may be caused directly by an injury to the iris, or indirectly by injury to the cornea, lens, or ciliary body, whether produced accidentally or by an operation. Its severity depends chiefly on the lodgment in the eye of septic matter or of a foreign body. When such a lodgment occurs it is apt to excite a purulent inflammation in which the pus infiltrates the iris while some passes into

the anterior chamber where it forms a hypopyon, but in other cases the inflammation is much less severe. An iritis caused by the constant irritation of a synechia may be properly classed as traumatic, and perhaps one caused by the instillation of a drug, such as eserine, may be included. The treatment must depend on the nature of the injury and the severity of the inflammation. When it is caused by a wound of the eyeball and it is seen in its early stage, the temporary use of ice cloths is sometimes advisable, but these should be soon stopped and the measures already mentioned instituted. When a foreign body is present its removal is usually necessary. In purulent iritis without the presence of a foreign body it is often advisable to confine our efforts to the usual treatment for iritis, atropine and hot water, although it is occasionally necessary to evacuate a hypopyon from the anterior chamber, an operation which should not be rashly undertaken, but should be reserved for selected cases. When there is a prolapse of iris from a wound it should be excised without delay. When an iritis is due to the presence of a synechia an iridectomy is the most commonly applicable method of relief, but sometimes an anterior synechia can be successfully divided and furnish a more satisfactory result. The use of any irritating drug should be stopped and in all cases the treatment already outlined instituted.

Any form of iritis may become chronic and persist for weeks or months in spite of the best care. Tubercular iritis may be said to be chronic from the first. Rarely in rheumatic cases, perhaps also in syphilitic, a form known as "quiet iritis" is met with in which there is no pain, circumcorneal injection, or other acute symptom, but only a progressive dimness of vision. This sometimes comes on after cataract extraction when the iris is slowly drawn up toward the cicatrix. The treatment is the same as for acute iritis, at least until the cause of the maintenance of the trouble can be determined. In some cases where an acute inflammation has become chronic this seems to be due to the irritation produced by the synechiae. When these are of moderate size it may be well to alternate the atropine with eserine or pilocarpine in the hope of tearing them asunder. When this fails an iridectomy may be performed. When the posterior synechiae have formed a ring around the

pupil and the iris bulges forward, particularly if an increased tension of the eye shows a threatened glaucoma, an iridectomy is imperatively indicated.

Probably the ciliary body is more or less involved in all cases of iritis, but usually the involvement is so slight that there is no clinical evidence of such a complication. When the ciliary body is seriously involved there is an increase in the intensity of the symptoms of the iritis together with oedema of the upper lid, severe pain and tenderness on pressure in the ciliary region, a more turbid aqueous, sometimes hypopyon, a deposit of exudates on the posterior surface of the cornea, a deepening of the anterior chamber from a retraction of the iris caused by an extensive posterior synechia, exudation into the vitreous and either increase or decrease of the intraocular tension. Such an inflammation is known as a plastic iridocyclitis. The interference with vision is much greater than in simple iritis, and the prognosis is much graver. The exudates into the vitreous cannot be removed, the interference with the nutrition of the eye may result in atrophy of the iris, of the chorioid, or of the entire eye, while the traction exerted upon the ciliary body by the contraction of masses of exudate may cause recurrences of great pain and even sympathetic ophthalmia.

Plastic cyclitis may possibly begin as an inflammation confined to the ciliary body, but if so the inflammation almost or quite invariably extends to the iris or chorioid or both at an early stage, so that a simple plastic cyclitis may be said to be almost, if not quite, unknown. The treatment for plastic cyclitis or iridocyclitis is the same as for simple plastic iritis.

Serous cyclitis, which is characterized by the serous or seroplastic nature of the exudation, is occasionally met with in cases where the inflammation appears to be confined to the ciliary body, but more frequently the adjacent parts of the uvea are also affected. The older names applied to this disease, serous iritis, aquo-capsulitis, Descemetitis, keratitis punctata, were suggested by its clinical appearances, while the modern names, serous cyclitis, iridocyclitis, iridochorioiditis, uveitis, indicate the pathological conditions which produce the symptoms. Serous cyclitis

is always chronic and is not attended by severe symptoms. There is a slight circumcorneal injection, the surface of the iris appears normal, the pupil normal in size or slightly enlarged. The chief symptoms are a loss of vision from cloudiness of the vitreous and a deposit of small, whitish, opaque spots on the posterior elastic lamina of the cornea, Descemet's membrane, with an increase in the depth of the anterior chamber. When the iris is involved the deepened anterior chamber becomes shallower and the tension of the eyeball rises, but may fall later. When the exudate is sero-plastic the formation of posterior synechiae is more or less marked as it approaches the plastic or the serous character.

The etiology of serous cyclitis seems to me to be as yet uncertain, and to be one of the subjects which authors are prone to avoid, ascribing both the plastic and serous forms to the same causes. Perhaps it is true that the etiology is the same in both, but it is suggestive that the serous variety is met with in menstrual disorders associated with anaemia, and, according to some authors, it is more common in women than in men. It is also sometimes the primary symptom of sympathetic ophthalmia.

This is the one form of iritis or cyclitis in which atropine is not the main reliance; here this drug must be used with great care if at all. If the tension of the eyeball is increased atropine is contraindicated and sometimes a myotic, eserine or pilocarpine, should be used instead. Diaphoretics, diuretics and laxatives are generally given the patient, together with such treatment as the apparent etiology of the case may indicate, but the inflammation is apt to pursue a monotonous, chronic course. When the tension becomes increased and glaucoma is threatened, not only the use of myotics, but the performance of a paracentesis or an iridectomy may be necessary.

Purulent cyclitis is commonly associated with purulent iritis and chorioiditis. There is intense pain, great circumcorneal injection, chemosis of the conjunctiva, oedema of the upper lid, turbidity of both the aqueous and the vitreous and the formation of a hypopyon in the anterior chamber. The hypopyon may appear and disappear several times, each reappearance marked by an exacerbation of the pain.

The tension of the eyeball is usually increased, sometimes lowered, and panophthalmitis usually soon supervenes. Most of these eyes are lost, but occasionally one can be saved by the energetic and early application of the treatment for iritis with such modifications as are indicated by the cause of the inflammation.

Inflammation of the whole of the uveal tract is known as uveitis, or iridochorioiditis. The acute form is either suppurative and a stage of panophthalmitis, or sero-plastic showing the advent of sympathetic ophthalmia. The chronic form starts with an attack of iritis or chorioiditis which becomes chronic and extends to the neighboring parts of the uvea. Meyer divided this disease into two varieties according as it began in the iris or the chorioid. In the first variety an iritis becomes chronic and the inflammation slowly extends backward. The posterior synechiae increase until the pupil is excluded, the aqueous accumulates behind the iris until it is distended and begins to atrophy, while fine opacities appear in the anterior part of the vitreous. The eyeball at first is hard, but later softens. Vision is interfered with at first by the vitreous opacities, later from impairment of the nutrition of the chorioid. De Schweinitz modifies these symptoms somewhat in his description, and gives those which would be expected if the primary iritis was serous. In the second variety the disease begins in the chorioid and may produce opacities in the vitreous, detachment of the retina and albumenoid infiltration of the lens before the iris is affected. Finally posterior synechiae are formed, the lens and iris are pushed forward toward the cornea so as nearly to obliterate the anterior chamber, and the same combination of symptoms is then presented as in the first variety.

In the early stage of cases of the first variety the disease may be arrested by an iridectomy and a good result may be obtained even after atrophy of the eyeball has commenced. The prognosis is very bad when the retina has become detached, or the ciliary body has become inflamed. Drugs which have been recommended are atropine when there is no increase of tension, myotics when the tension is increased, mercury, potassic iodide and diaphoretics internally, and subconjunctival injections of salt solution,

but none of these means have proved of much service unless in exceptional cases.

Injuries.

The iris may be injured by a foreign body penetrating the eye, or as the result of a concussion from a blow on the eye. As the result of a penetrating wound the iris may become incarcerated or prolapsed, may be incised or lacerated with or without injury to the deeper portions of the eye. When seen shortly after the injury an attempt may be made to replace an incarcerated or prolapsed iris by the instillation of atropine or eserine, according to the location of the wound, or by means of an iris repositor, but if for any reason this cannot be done, or if the prolapse is very large, or if it has been exposed to infection, it should be drawn out through the wound and excised, the eye thoroughly cleansed, atropine instilled and ice cloths applied for a short time to prevent traumatic iritis. A simple incised wound of the iris is not infrequently a result of an operation, but it is seldom met with as the result of an accidental injury and is rarely serious. The blood which escapes into the anterior chamber is soon absorbed and if no septic matter has been introduced the wound heals readily. When the ciliary body has been wounded the danger of a sympathetic ophthalmia should be explained to the patient before an attempt is made to save the eye. If the wound is small and clean the edges of the cut conjunctiva may be drawn together over the wound, the eye dressed antiseptically and the patient put to bed. During the first forty-eight hours ice cloths may be used to prevent inflammation, but after that time they are of little value. If the wound is extensive, ragged, infected, or if a foreign body has lodged in it in such a way that it cannot be removed without serious injury to the ciliary body, enucleation, or one of the substitutes for that operation should be performed at once.

Laceration of the iris from concussion, with or without rupture of the outer coats of the eye, is not infrequent. The tear is usually at the ciliary attachment, and the severity of the injury varies from the rupture of a few fibers to the total separation of the iris so that it lies detached in

the anterior chamber, or is extruded from the eye. A totally detached iris should be removed through an incision at the lower corneo-scleral margin, if the condition of the rest of the eye will permit, but this is seldom necessary as the condition is very rare. More commonly the rupture is partial and treatment with atropine and a bandage is indicated. As long as any part of the iris remains attached this condition is known as iridodialysis, when it is complete it is called by some authors aniridia, a name at one time applied to congenital absence of the iris. It is said that in a few cases where the iridodialysis was small the ruptured fibers have been induced to heal by vigorous treatment with atropine, but usually a dehiscence is left in the iris which if large may cause diplopia.

After a blow on the eye the pupil is often seen to be dilated and some authorities claim that in these cases there is always a slight rupture of the sphincter; sometimes a distinct notching of the margin of the pupil can be seen. Lacerations of the iris close to the pupil have been reported, but they are very rare. A tremulous iris indicates the withdrawal of its posterior support by the partial or complete dislocation of the lens. Very rarely as the result of traumatism a portion of the iris is folded backward over the ciliary processes, and becomes invisible, or it may be folded forward so as to expose its under surface. Such conditions do not as a rule admit of treatment.

A foreign body lodged in the eye may become encapsuled and remain there harmless for many years, but it is more apt to set up a destructive inflammation, therefore an attempt to remove it is usually advisable. The best method to remove a piece of iron or steel is to draw it with a powerful magnet either through the wound of entrance after it has been enlarged, or through a wound of sufficient size made for the purpose at a place where the withdrawal will inflict the least injury. But a magnet is not always available and foreign bodies are not always made of iron or steel; in such cases other means must be resorted to.

If the foreign body is lying in the anterior chamber on the iris a large opening should be made at the lower corneo-scleral margin and then, if it is not washed out by the escaping aqueous, it may be removed with a pair of forceps,

sometimes with a probe. When it is entangled in the iris an attempt may be made to disentangle it after the anterior chamber has been opened, but usually it is necessary to withdraw it together with the attached portion of iris and to excise the mass. When the foreign body is in the posterior chamber an iridectomy is generally needed, sometimes it can be seized in the forceps together with the overlying iris and withdrawn. The portion of iris drawn out should be excised. When a foreign body has lodged in the ciliary body the prognosis is grave. If it has entered through the sclera, and can be seized with a pair of forceps, it should be removed and the wound may then be treated as already described, but if it has been driven through the cornea, iris and lens to become engaged in the ciliary body, the chance for a successful removal is small. When infection has occurred, enucleation, or one of its substitutes, is the safest procedure.

Tumors.

Tumors of the iris and ciliary body are rarely met with. A primary sarcoma of the iris is hardly ever seen, but a few cases have been described. It forms usually a small, dark, slowly increasing growth during its early stage, though later it may grow rapidly, cause hemorrhage and pain, and even burst the eye. Very rarely it appears as a leucosarcoma, and then there is some difficulty in differentiating it from a gumma or a tubercular mass. When the sarcoma is small and circumscribed, so it can be removed in its entirety with surrounding healthy iris, such a removal should be attempted because several successful operations of this nature are on record. If this can not be done, the eye should be enucleated. Melanoma of the iris is a dark, quiet tumor which is usually harmless, but as it is sometimes the precursor of sarcoma it should be carefully watched for any increase in size. A sarcoma of the ciliary body causes the iris to bulge forward and may produce an iridodialysis through which the brown tumor can be seen. Later the iris becomes inflamed or atrophied and symptoms of glaucoma supervene. The sarcoma may be round celled or spindle celled, pigmented or, rarely, non-pigmented. Metastatic carcinoma of the ciliary body has been reported. The presence of a malignant tumor in the eye is an imperative

indication for enucleation, none of the substitutes for that operation are permissible, the entire eye must be removed.

A cyst of the iris with transparent, delicate walls lined with pavement epithelium is called a serous cyst, and may be either congenital or of traumatic origin. Other cysts are usually the result of a bit of skin, corneal epithelium or eyelash being driven into the anterior chamber, and proliferating; they have been classified in various ways. As soon as a cyst of the iris has been recognized it should be excised with the attached portion of iris, because otherwise it will be apt to grow and destroy the eye by pressure. Sympathetic ophthalmia has also been ascribed to the injury done by a cyst of the iris.

Gummata and granulomata have been dealt with already under syphilitic and tubercular iritis.

Angiomas, lipomas, and perhaps other tumors of the iris, as well as myomas, angiomas, cysts and ossification of the ciliary body, have been reported, but they are all of exceeding rarity. When excision is practicable it is the safest plan of treatment.

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ABSTRACTS FROM ENGLISH OPHTHALMIC
LITERATURE.

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Morax-Axenfeld Conjunctivitis.

MCKEE, HANFORD, Montreal, Canada (*Ophthalmology*, April, 1908), says that perhaps the commonest and most widely spread disease of the conjunctiva is what is known as "diplo-bacillary conjunctivitis," described by Morax and Axenfeld in 1896, and often called by their names. Usually both eyes are involved, beginning as a slight catarrhal conjunctivitis, rapidly increasing in severity for twenty-four to forty-eight hours, when there will be noticed a marked reddening of the lids, especially at the outer and inner canthi; some maceration of the skin and in the conjunctival sac a varied amount of watery or purulent discharge. The patient often complains of considerable pain in the eyes, especially when reading at night.

Occasionally there is marked epiphora. In many cases the follicles in the lower palpebral conjunctiva are prominent; indeed, the diplo-bacillus seems rather prone to inhabit old trachomatous conjunctivae. A certain diagnosis can only be made by bacteriological methods. A little secretion may be taken up on a platinum loop and smeared on a glass slide, fixed and stained with Gram's stain, using a weak solution of safranin as a counter stain. With the oil immersion lens, on the field may be seen a multitude of Gram negative bacilli, lying in pairs generally, 2 to 3 mm. long by $1\frac{1}{2}$ mm. wide, nearly square at the ends, either free or within the pus cells. It may be differentiated from Petit's diplo-bacillus by cultivation. The diplo-bacillus stands drying well. Cultures have been made from dry specimens as late as 14 days after collection. The most serious complication liable to occur is ulceration of the cornea, but luckily this is not a common occurrence. The treatment, par excellence, is irrigation with a half grain to the ounce zinc sulphate solution three or four times a day. Silver seems to have little effect upon it. A. F. A.

**Papilloma of the Conjunctiva, with Report of a Case
Successfully Treated with the X-Ray.**

FAITH, THOMAS, Chicago (*Journal of Ophthalmology and Oto-Laryngology*, April, 1908), reports the case of a Hebrew 28 years of age who had been treated for trachoma of the right upper lid and had undergone several operations in the course of six years. When seen by Faith in March, 1904, the palpebral conjunctiva of the right upper lid was covered with a fleshy growth of a nearly uniform thickness extending throughout its entire length. In many respects the appearance of the lid was that sometimes seen after an attack of gonorrhoeal ophthalmia, but the conjunctiva was much thicker, very red and fleshy, so as to resemble a piece of heavy plush. In one or two places the growth had protruded over the free border of the eyelid, but was not attached to it. The retrotarsal fold was involved to some extent, but the ocular conjunctiva, semilunar fold and caruncle were entirely free. A section of the growth was removed, examined microscopically and pronounced a border line papilloma, probably non-malignant. X-ray treatment was commenced April 12. The exposures were of six to ten minutes' duration and were made three

times a week without everting the lids. After four weeks the exposures were made less frequently as the growth was changing rapidly in appearance. After June 20 they were made only once a week, and on August 6 the conjunctiva was found to be free from growth and apparently of normal thickness. A few scars remained in the conjunctiva, such as are seen after trachoma. The treatment was stopped on August 22. In February, 1907, the conjunctiva was perfectly smooth and healthy.

M. L. F.

The Ophthalm-Tuberculin Reaction.

BRAWLEY, F. M., Chicago, (*Ophthalmic Record*, April, 1908), in presenting this subject, says that to Wolff-Eisner belongs the honor of first introducing this measure, and to Calmette the credit of elaborating the method of its practical application. The solution, ten per cent, used by the former, was too severe; the latter made a solution of one per cent. of dried tuberculin, which was practicable. The writer says that the term "suspension" as used by Smithies and Walker is not correct, the product being a solution, not a mechanical suspension.

When making the test one drop of the one per cent. solution is dropped into the lower cul-de-sac near the outer canthus, the lid being held away from the globe so as to allow the solution to flow over the conjunctiva; the patient being instructed not to rub the eye nor use any form of treatment. The reaction occurs within from three to thirty hours and is a conjunctivitis of varying degree, showing in its mildest forms reddening of the caruncle and conjunctiva of the lower cul-de-sac, increased mucous secretion and so on, to great swelling of the lids and muco-purulent discharge.

The reaction is explained by Citron and v. Pirquet, who say that the tubercle bacilli somewhere in the body secrete material which reacts upon the receptors of the body cells, rendering them sensitive to tubercle toxins, so that all the body cells are capable of producing anti-bodies when brought into contact with them.

Smithies and Walker, whose reports were based on the results of 242 cases, believe that the variations in the published reports are due to a lack of uniformity in administering the tuberculin and to the difference in the preparations of it, and

also to unknown conditions which may exist and influence the reaction.

The writer remarks that Wiens and Gunther are almost the only authorities who sound a note of warning as to the eye test tending to aggravate an existing conjunctivitis.

This article is a very long and comprehensive one.

O. W.

The Conjunctival Tuberculin Reaction in the Diagnosis of Eye Diseases.

NANCE, W. O., and SWIFT, C. W.. Chicago (*The Journal of Ophthalmology and Oto-laryngology*, February, 1908), have employed the Calmette method in 22 instances. In three cases where a negative result was obtained they repeated the test twice, and in a few instances three or more times. The cases include phlyctenular conjunctivitis and keratitis (6), sclerotizing keratitis (1), scleritis (2), iritis (2), chorioiditis (3), interstitial keratitis (2), chronic conjunctivitis (1), and papillitis (1). Positive reactions were obtained in 14 cases and negative reactions in 8.

M. L. F.

Interstitial Keratitis After the Use of Calmette's Ophthalmo Reaction.

KNAPP, ARNOLD (*Archives of Ophthalmology*, March, 1908), reports a case of typical tuberculous interstitial keratitis in a previously healthy eye that followed the instillation of the tuberculin solution which produced severe and general manifestations. Six hours after the instillation the lids became very red and swollen, and the child complained of great pain. During the following two days the local condition remained about the same, the lids could be separated with difficulty, there was a thin muco-fibrinous discharge which microscopically showed no organisms. The general reaction was marked; the temperature rose to 100.4° F. With cold applications, irrigations with salt solution and argyrol, the local symptoms abated, but the conjunctiva remained red and thickened. About ten days later the corneal infiltrations appeared. These were first arranged in groups and later coalesced, forming three yellowish grey patches. The conjunctiva was smooth and moderately injected and there were no gross lesions in the iris or in the angle of the anterior chamber. This was a

typical tuberculous process in the cornea, and as it came on after the use of the tuberculin solution in a previously healthy eye, a connection seems very probable. This unfortunate case demonstrated that the ophthalmo-reaction cannot be regarded as harmless.

H. G. G.

Oxide of Copper in the Cornea.

RUST, EDWIN G., Cleveland (*Archives of Ophthalmology*, March, 1908), explains the formation of oxide of copper by combustion, which takes place as the wheel of the trolley pole runs over the plates forming the hangers and switches. Under the influence which makes poor or interrupted contact, the copper is detached, immediately oxidized, and thrown off in brilliant sparks. The substance of these sparks occasionally strikes the cornea, and always becomes deeply inbedded. An examination of the case reported showed a brown-black circular body about 1 mm. in diameter, smooth on its outer surface, but with its under side raggedly spreading into and beneath the corneal epithelium. To the contact of an instrument the foreign substance seemed like half rotten rubber, and was very difficult to remove. It was found on analysis to be oxide of copper. Since this case his records show that twenty-six other persons have come to him with oxide of copper in the cornea. In none of the cases was there a tendency to ulceration. Oxide of copper is a substance which does not scratch, as it is smooth, and often is almost buried beneath the epithelial cells. The ciliary injection, pain, and photophobia are intense, until every vestige of the copper is removed.

H. G. G.

Interstitial Punctate Infiltration of the Cornea.

SPENCER, FRANK R., Boulder, Colo. (*Colorado Medicine*, May, 1908), reports the following interesting case: A man 23 years of age, who had contracted syphilis two years before, and had been under treatment for that disease until eleven months previous to the onset of the symptoms of which he complained, consulted the author because of redness of the left eye with blurred vision. The eye smarted occasionally and was more sensitive to light than usual, but was free from pain. The author's description of the case is as follows:

The skin had a muddy color, due in part, at least, to ma-

larial pigmentation. The patient was fairly well nourished, his general health being only slightly below par.

The distant vision was 15/10 for each eye and Jaeger test type number one was read with each eye at fourteen inches. The anterior segment of the right eye was negative. The left, however, showed a slight circumcorneal injection which was most prominent opposite the palpebral aperture. The pupillary area of the cornea showed thirteen small opacities which were pin-point in size, with the exception of one, which was about twice the size of the others. The corneal epithelium had not undergone any change. Oblique illumination showed these opacities to be deeply situated in the corneal tissue. They had an irregular concentric arrangement instead of the triangular which we see with deposits upon Descemet's membrane during attacks of iridocyclitis. The iris of each eye reacted well to light and accommodation; the media were clear, and the fundi were negative.

Diagnosis: Interstitial punctate keratitis of specific origin.

Treatment: The patient was given a prescription for potassium iodide; ten grains to be taken after each meal. Anunction of unguentum hydrargyrum was also ordered once a day. After one week the dose of potassium iodide was increased to fifteen grains. The pupil was kept dilated by a 1 per cent. aqueous solution of atropine sulphate.

On January 20, 1906, most of the infiltrate had disappeared, and by January 24, it had completely disappeared, leaving the cornea perfectly clear.

His conclusions are:

1. Cases of interstitial keratitis due to acquired syphilis are rather common, but they usually occur during the tertiary stage.

2. Punctate infiltrations of the cornea due to acquired syphilis are very rare.

3. Syphilitic keratitis usually leaves an opacity, but in the case of Mauthner's and that of the author's such was not the case.

4. These cases should be given a place in our text books of ophthalmology, as several varieties of the mild type properly belong under this head.

M. L. F.

**Primary Melanotic Spindle-Cell Sarcoma of the
Corneal Limbus.**

VEASEY, C. A., Philadelphia, Pa. (*Trans. Am. Oph. Soc.*, Vol. XI., p. 282), writes that all tumors having their origin in the corneal limbus are of comparatively infrequent occurrence, but this is especially true of sarcomata, only 3 having been met with in 520,523 out-patients in the Manchester Royal Eye Clinic and 2 in 44,719 at the Mass. Charitable Eye and Ear Infirmary. The present case was W. B., male, 47 years old, seen October 23, 1906, who stated that there had been a small brownish spot just to the temporal side of the corneoscleral juncture for about twelve years, which had given no trouble and had not increased in size until recently. Seven weeks before he came it had commenced to grow rapidly. There was one large growth with two lobules, covering about two-thirds of the corneal surface, the upper layer, ovoid in shape, was 11 mm. long, 10 mm. wide, elevated 5 mm. above the normal corneal surface and extended $1\frac{1}{2}$ mm. beyond the corneal margin on the sclera. It was firmly attached to the underlying ocular structures, possessed no undermining edge, and was dark brown in color, some portions being more deeply pigmented than the rest. The lower and smaller growth was 10 mm. long, 6 mm. wide, elevated 5 mm., and its color a light pinkish hue. The apex was ulcerated and bled upon the least manipulation. The iris was of good color and appearance, the anterior chamber unaffected, the pupillary reactions prompt and the fundus normal so far as could be seen. Enucleation was advised and done two days later. There has been no recurrence up to the present time. Microscopic examination of sections show that the pericorneal tissues in the neighborhood of the upper growth were densely infiltrated with tumor and inflammatory cells. Sections of the superior tumor showed an irregular reticulated structure, strands of large brown cells dividing the surface into large and small spaces. Assisting in the formation of and further dividing them were interlacing strands of spindle tumor cells. The lower lobule showed the same general structure. The cells in the periphery of the infiltrating mass had large, globular nuclei with prominent nucleoli. The more densely packed cells of the central portion were of a short spindle type. In the depth of the tumor

definite, patulous blood-vessels were infrequently observed. The condition was undoubtedly a spindle-cell sarcoma. Such growths commonly have a small base, but such was not the case here. Such growths have little tendency to involve the sclera or the deep layers of the cornea. The tendency to extend rapidly and to recur at distant points, with fatal result, is urged as the reason for immediate enucleation.

A. F. A.

Proliferative Uveitis.

ZENTMAYER, W., Philadelphia, Pa. (*Trans. Am. Oph. Soc.*, Vol. XI, p. 313), quotes the views held by Fuchs that in eyes destroyed by sympathetic inflammation it is characteristic of the chorioiditis in the exciting eye that the infiltration becomes denser toward the posterior pole of the eyeball. The exudate consists of lymphocytes and epithelioid and giant cells and is confined to the stroma of the affected membrane. If a surface exudate occurs on the iris and ciliary body it is due to a mixed infection. He holds that in pure exciting inflammation there is no plastic inflammation present. Ruge does not consider either the grade or the location of the chorioidal inflammation as pathognomonic, the chorioid in some cases being intensely and in other cases not at all involved. He holds that frequently the chorioid is found strongly infiltrated anteriorly and adjacent to the ciliary body, while posteriorly it is quite free from inflammation. The author reports two cases, in the first of which the contents of the eyeball had been destroyed by a purulent inflammation which had evidently spread from the anterior segment, from the perforated cornea, and had been succeeded by a plastic form of inflammation with the production of many giant cells and the proliferation of the endothelial cells of the tissues. This tissue was then going on to the formation of connective tissue, causing shrinking and destruction of the eyeball. The other case shows that the pericorneal zone was injected, there was a fine precipitate upon the membrane of Descemet and a marked neuroretinitis with peripapillary oedema. It also showed an entire absence of plastic adhesions and superficial fibrinous exudate.

A. F. A.

Experiments on the Influence of Ultra-Violet Light on the Lens.

HESS, C., Wuerzburg (*Archives of Ophthalmology*, May, 1908), made the following experiments with Schott's uviol mercury vapor lamp, which includes wave lengths of 253 mm, or about four-fifths of all available ultra-violet rays. The intensity of the current was uniformly 3-3½ amperes. The animals were exposed at a distance of about ten to twenty cm. from the tube, and exposed once or twice for 1-16 hours. At the distance noted, the temperature did not rise above 20-25° C. No concentration of the light, as for instance by means of a lens, was used in this series, so that there can be no question of a possible action of heat. In almost every case, frogs, guinea-pigs and rabbits showed extensive and characteristic changes in the epithelium of the lens capsule, so that with comparatively simple apparatus a field of experimental study is opened which is important for many questions besides those of the pathology of the lens. Some time after exposure the eyes were enucleated and hardened in Zenker's solution. Surface and cross sections of the lens epithelium of about 100 animals were studied. The changes in the frogs' lens were found to be quite similar to those found in the mammalian lens. Microscopic examination with the loupe occasionally revealed a faint clouding in the pupillary area of the lens. Microscopic changes indicating degeneration were found after ¾ hours' exposure on the day after the experiment, and in most cases exposure of 5-6 hours caused destruction of cells. Repeated exposure of several hours produced marked signs of degeneration. These were noted after 48 hours as a result of exposure for only 2-3 hours. After interposing a pane of ordinary glass, not more than 1 mm. thick between the light source and the eye of the animal, no degenerative changes whatsoever were noted in the lens, even after prolonged exposure. The writer did not get the impression that the cells of the lens epithelium of warm blooded animals were more sensitive to ultra-violet light than those of cold blooded animals, but that the regenerative processes were much more active and rapid. The method described allows us to modify intra-lental metabolism in a very simple way. In massage cataract we mechanically injure or destroy a certain number of epithelial cells; in naphthalin-cataract the cells are

evidently destroyed by poisons which penetrate the lens from without; in exposure to ultra-violet light, short waved rays probably produce changes within the cells only, which may be interpreted as oxidation and reduction in the protoplasm, although it must be borne in mind that similar changes have been observed after exclusion of oxygen. H. G. G.

Particles of Glass as Foreign Bodies in the Lens.

LAQUEUR, PROF., Strasburg (*Archives of Ophthalmology*, March, 1908), calls attention to the extreme rarity of this condition, which he asserts is not surprising when we consider the peculiar circumstances which permit the entrance of a foreign body into the lens and its remaining there. It must naturally be small and must have a low kinetic energy. Among thousands of cases of injury of the eye the writer has only had the opportunity of twice seeing splinters of glass in the lens. In his first case for three years and a half the splinter remained inactive and then a cataract began which required a year and a half for its full development. In the second case, ten months after the injury the lens had remained clear with the exception of a few fine opacities about the foreign body. The accommodation was reduced, the range being only 5.5 D. The writer believes that this case will result as the first did, so that it will be necessary to extract the lens. He states, that there can be no doubt that the formation of the cataract is due to chemical changes in the glass, for glass is not as insoluble as it is supposed to be.

H. G. G.

An Unusual Form of Hereditary Congenital Cataract Occurring in Several Members of a Family.

CHANCE, BURTON, Philadelphia, Pa. (*Trans. Am. Oph. Soc.*, Vol. XI, p. 334), reports the case of a family of eight people, the father and four children of which showed congenital cataract. In all of the five members of the family afflicted there was a faint cataractous opacity covering the pupillary space. The opacities were partial and circumscribed and could be seen only by using strong lenses in the ophthalmoscope. In each person they were double and accurately symmetrical in the two eyes. They appeared to be stationary. They were not polar nor nuclear, but seemed to lie between the nucleus and

the posterior pole. The visual acuity was below normal in every case, for myopia was defined in each. The people were healthy and showed no evidence of rachitis. A. F. A.

One Hundred Consecutive Cases of Cataract Extraction.

DUNCAN, J. L., Pittsburg, Pa. (*Archives of Ophthalmology*, May, 1908), after briefly reviewing the history of cataract extraction considers the following mooted questions: 1. The best incision for the extraction of the cataract; 2. Whether or not to do the simple or the combined operation; 3. Whether to make the iridectomy (if we decide upon the combined operation) some weeks before the cataract is removed, or immediately before the extraction; 4. Whether or not irrigation of the anterior chamber is advisable in removing cortical matter, blood, air bubbles, etc. From his one hundred cases reported he draws the following conclusions: 1. Two forms of corneal incisions were used, but the one most frequently adopted was an upward section that involved fully two-thirds of the cornea and followed the periphery of the cornea, the central point of the flap falling on the vertical meridian of the cornea. 2. The combined operation was performed in each instance. The iridectomy in twenty-three cases was made about six weeks before the extraction. 3. In all cases where we have a rigid iris, a tendency to rheumatism and glaucoma, or where we have an immature cataract, a preliminary iridectomy should be done. But when the patient presents decided senile changes, when there is a remote possibility of infection, or when we have a case of old chronic bronchitis or nasal catarrh, then the iridectomy should immediately precede the capsulotomy, as he believes it is not wise to open the cornea twice, thereby jeopardizing the eye twice to infection. 4. He uses irrigation of the anterior chamber as a routine measure, making the tip of the irrigator serve as an iris replacer, and secures asepsis by boiling, and the use of sterile, normal salt solution, temperature about that of the body. He does not advocate the use of germicidal solutions in washing out the interior of the eye during cataract extraction. H. G. G.

Removal of the Lens in High Myopia.

LAMBERT, W. E., New York, N. Y. (*Trans. Am. Op. Soc.*, Vol. XI, p. 293), states that the examination of the 2,550 re-

ported cases of removal of the lens in high myopia shows a great difference of opinion as to the best method of operating and also the class of cases in which the operation is indicated or justified. Four cases are reported in full, each of which was satisfactory at every point. In each the lens was needled under cocaine enough times at intervals of two days to secure swelling and opacity of the lens, followed by linear extraction; all soft matter being removed by free irrigation with normal salt solution, followed by atropine and hot water. In the discussion it was suggested that the corneal curvature should be carefully measured to determine whether the condition was one of myopia of curvature or axial myopia. In the latter case we should expect a change of 18 or 20 diopters, whereas a change of only 10 or 12 diopters will otherwise result, and we may change a high myopia to an almost equally troublesome hypermetropia. The condition of the chorioid is also an important thing to determine. The myopic eye may show signs of former chorioidal disease which may at the time of the operation be quiescent. If this is the case the probabilities of favorable results from operation are good, otherwise the surgical interference would be perilous. A. F. A.

**Probable Metastatic Hypernephroma of the Chorioid
with Microscopical Findings.**

SMALL, C. P. (*Ophthalmic Record*, February, 1908), describes a case of probable hypernephroma of the chorioid with microscopical findings in a woman 43 years old. When first seen the left eyeball was highly inflamed; the entire conjunctival surface being deeply injected and congested and the lids swollen. The lens was opaque, pearly white with sectors of a more brilliant whiteness; there was swelling of the conjunctiva to the nasal side of the cornea. The globe was extremely sensitive to pressure with absolute loss of light perception. Tension was minus two. Five weeks previously the patient had been struck with considerable force by something which dropped on her from a bridge under which she was passing. The injury caused her excessive pain for three days, when, owing to a severe mental shock which caused her much grief, she was unconscious of the pain for several days, but one week from the time of the injury the pain became more intense than ever and the lids were so swollen that the eye could

not be opened. After a week the swelling subsided, but the pain continued. X-ray pictures and the Haab magnet failed to show the presence of a foreign body.

Hot applications were used frequently for a few days, and an instillation of a five per cent. solution of dionin was made in the conjunctival sac three times a day.

Vision was completely lost, and the organ was enucleated, after which perfect healing followed, and she now wears with comfort an artificial eye.

The specimen after hardening was cut through in the middle antero-posteriorly in the horizontal meridian. This disclosed a tumor attached to the posterior surface of the choroid, bi-convex in shape and 9 x 6 mm. in size.

The complete pathological findings are given in detail and must be read to be appreciated.

Diagnosis suggested the possibility of an endothelioma or metastatic hypernephroma.

O. W.

Retinitis, Proliferating in Character, in a Detached Retina of Traumatic Origin.

SHOEMAKER, WILLIAM T. and HOSMER, C. M., Philadelphia, Pa. (*Trans. Am. Oph. Soc.*, Vol. XI, p. 320), report the case of a girl of 12 years, who seven years before fell, striking her left eye against the hearth. Soon after the eyes were seen to be crossed, and four years later the pupil was whitish, following which the eye became injected. From that time headache and pain in the eye, periodic in character, occurred monthly. At the time of the examination the left eye was blind. It had within it a large gray or white growth, plainly seen through the pupil, especially when dilated. The mass was far forward in the vitreous. It seemed to spring mostly from the nasal side of the eyeball, was soft looking, somewhat nodular and without movement. The conjunctiva and the entire anterior segment of the eye were free from injection and seemed to be normal in every way. The movements of the eyeballs were free in all directions and the tension was normal. The diagnosis of glioma was made and the eye enucleated. The pathological report showed that the retina was detached to the ora serrata and pushed or drawn into folds. Lying upon the detached retina there was a mass of organized connective tissue. The entire retina was bulged

forward by sub-retinal exudate and the mass would easily suggest tumor. It is believed that the mass of connective tissue represents a large hemorrhage into the nerve fiber layer, with organization subsequent to the complete detachment. The rod and cone layer had disappeared entirely, as would be expected when totally separated from its source of nutrition. It is probable that the process, once started in a more or less limited detachment at the time of injury, proceeded until it became complete and may be regarded as an endo-retinitis proliferans.

A. F. A.

Extensive Disease of the Retinal Vessels, Followed by Proliferating Retinitis in a Young Colored Man.

DE SCHWEINITZ, G. E. Philadelphia, Pa. (*Trans. Am. Oph. Soc.*, Vol. XI, p. 270), reports the case of a young colored man, aged 23, who gave a negative family and personal history. In September, 1905, he came to the writer for relief of fronto-occipital headache. V. O. D. = 6/5. V. O. S. = 6/15. The ophthalmoscope showed the media clear, no lesion of the fundus of either eye. A year later, V. O. D. was 6/15, V. O. S. 6/6. The right eye was more prominent than the left, but no limitation of movement and no diplopia; the cornea was slightly hazy, with a small ulcer and slight ciliary injection, the lens and the vitreous were clear, the veins swollen, uneven and thickly coated with white tissue. Between the branches of the upper and lower temporal veins and upper nasal veins there were extensive sheet-like hemorrhages and some areas of white exudate; the arteries in comparison with the veins were small and were also lined with white tissue, that indicated infiltration of the walls. Examination of the left eye showed a precisely similar although less marked condition. No constitutional disease could be found. At the end of two weeks V. O. D. was reduced to hand movements and V. O. S. to 6/150. Examination of the rhino-pharynx revealed enlargement of the turbinates with chronic congestion of the mucous membrane. A large mass of adenoid tissue filled the vault. The pharyngeal and faucial tonsils were removed under cocaine without difficulty. The skiagraphic examination of the patient's head showed an abnormal development of the accessory sinuses of the respiratory passages. The frontal sinuses were enormous and extended the entire width

of the frontal region and well around into the temporal fossae. Bony partitions were apparently lacking and the walls were abnormally thin. The sphenoidal and ethmoidal sinuses showed similar characteristics. During the next six months well marked proliferative retinitis developed until V. O. D. was reduced to hand movements only. The vitreous was cloudy and the disk could not be seen, but from around it large veils of bluish-white tissue, carrying on their surface twisted vessels, hemorrhages, etc., developed, and it was evident that the retina was partially detached. Such changes are generally ascribed to syphilitic infection, but no evidence of this disease could be discovered in this case. The value of the skiagraph is evident in showing the entire osseous structure of the orbital region, and it is of some interest to note the prompt subsidence of the acute irido-cyclitis, as well as the lessening of the exophthalmos which followed the removal of the adenoid mass.

A. F. A.

Report of Three Cases Presenting Ocular Manifestations of Tertiary Syphilis in Colored Subjects.

POSEY, WM. CAMPBELL, and KRAUSS, FREDERICK, Philadelphia, (*Ophthalmology*, April, 1908), records a patient, 42 years of age, who complained of reduced vision and in whom the ophthalmoscope showed an advanced degree of retinal arteritis with secondary atrophic changes in the retina and optic nerve. The retinal arteries were much reduced in size, especially near the disk, where they were mere threads. They were covered with a grayish white opacity. The veins were not reduced in size, but showed the same covering. Remains of old hemorrhages as well as one fresh one were seen. As the process occurs in the retinal vessels as a rule simultaneously with endoarteritis obliterans in the cerebral vessels, an ophthalmoscopic examination is of much semeiotic importance. A second patient, 32 years old, with a specific history, complained of double vision of five days' duration. Examination showed complete left iridocycloplegia with weakness of the internal rectus of the left eye. A week later the ocular paralysis became complete. The fundus remained normal. His condition improved rapidly under mixed treatment. A third patient, aged 50, complained of persistent occipital headache for eight months. Ophthalmoscopic examination showed a low grade

neuro-retinitis of both eyes and all the muscular movements fairly good. Two months later complete palsy of both branches of the left third nerve developed. The head pains entirely ceased with the onset of the palsy. Attention is called to the importance of recognizing disturbances in the ciliary muscle and iris which not infrequently are the earliest manifestations of syphilis in the system.

A. F. A.

A Case of Intra-ocular Tuberculosis Which Closely Simulated Glioma of the Retina.

THEOBALD, SAMUEL, Baltimore, Md. (*Trans. Am. Oph. Soc.*, Vol. XI. p. 369), reports the case of a negro lad, 5 years old, whose right eye showed a circumscribed scleral staphyloma at the nasal side of the cornea. Ophthalmoscopic examination revealed marked opacity of the vitreous, with a reflex strongly suggestive of glioma of the retina. Three weeks later the eye was enucleated. Recovery was uneventful. Nine weeks later the orbital contents presented a healthy appearance. Section through the middle of the eye revealed a mass of abnormal tissue that nearly filled the cavity of the eye. The lens was pushed forward, the retina was included in the mass and lifted up from the underlying chorioid, from which it was separated by a pigmented coagulated mass. The vitreous was reduced to a very small amount. The mass extended through the sclera and spread out over the surface as far as the edge of the cornea. It was composed of dense granulation tissue, throughout which were scattered numerous tubercles with typical giant cells. The tuberculous granulation tissue was found to begin far forward in the retina and the elements of the retina were stretched apart and fragments found scattered here and there in the substance of the tissue, usually, however, on its outer surface. The sclera also showed some isolated tubercles. No tubercle bacilli were found.

A. F. A.

Concerning the Vascular Changes in the Retina and Optic Nerve in the Toxic Amblyopias.

DE SCHWEINITZ, G. E., Philadelphia, Pa. (*Trans. Am. Oph. Soc.*, Vol. XI, p. 337). Extreme diminution in the size of the retinal vessels is the rule in genuine amaurosis both in man and animals. Large veins, with normal arteries, have been re-

ported in the earlier part of the disease. Later the usual contraction has taken place. The capillaries, even on the disk, have remained permanently filled, but later they may collapse and the appearance of atrophy supervene. Occasionally a gray haze in the retina and a cherry colored spot in the macula, almost the picture produced by obstruction of the central retinal artery, has been seen. The superior nasal artery has been seen to be converted into a white string with white thickenings along the inferior nasal and temporal arteries. In one case, four days after the onset of complete genuine blindness, in a man of 43 years, after the ingestion of 240 grains of sulphate of quinine in twelve hours, examination showed "extreme pallor, nerve pearly white, thrombus of the inferior branch of the retinal vein, endoarteritis of the large branches and obliteration of the small arteries, veins dilated." Vascular changes in the chorioid either do not appear or have been but little studied. In long-standing quinine blindness in animals careful examination fails to confirm the presence of any true endovasculitis. There appears, however, an oedema with stretching either of the fibers of the walls of the central vein of the retina or of the loose connective tissue which encases it. No thrombus formation takes place. Extensive vascular disease of the optic nerve has been described by a number of observers, but there is no satisfactory evidence that these alterations constitute the underlying basis of the disease. Ophthalmoscopic examinations show retinal hemorrhages and other evidence of vascular degeneration and pallor of the disk. But as most patients with intoxication amblyopia have reached an age when vascular degeneration is likely, particularly in persons of their habits, these ophthalmoscopic findings are naturally to be expected. Great vascular development in the interstitial connective tissue of the atrophic region has been described by many observers. In the author's own case of toxic amblyopia very decided vascular changes were evident in the optic nerve vessels as well as in the chorioid and retina. In no place, however, had there been any distinct disease of the retina. It was, rather, a fibrosis of the wall itself with hyaline alteration. The same changes were noted in the retinal vessels and diseased optic nerve. The changes in the optic nerve were of such a kind as to suggest the view that degeneration may be a simple consequence of the lesions of the

ganglion cells. The rapid post-mortem changes in these cells makes it very difficult to speak of changes which may have preceded death. The probable relation of the blood-vessel distribution must be considered with regard to the failure of the papillo-macular layers of the nerve, but it is not correct to say that the changes in the vessels alone cause the localization of the disease. In the author's case of human methyl-alcohol poisoning, no characteristic changes could be positively referred to the drug unless it was a layer of oedema surrounding the central artery and central vein of the optic nerve which resembled a similar oedema which has been noted between the septa and the nerve-fibers as the result of an artefact.

A. F. A.

Affections of the Optic Nerve During Pregnancy.

KNAPP, ARNOLD, New York, (*Archives of Ophthalmology*, March, 1908), has observed ten cases in which the optic nerve and retina during pregnancy and labor showed changes which differ from those of retinitis albuminurica gravidarum. After a study of the general symptoms he divides them into two groups, one which is now recognized as toxæmia of pregnancy and the other as sepsis. As the former predisposes to the latter the symptoms are often combined. He then reports the histories of three cases of neuritic atrophy with no other change in the eye grounds which occurred in pregnant women with other manifestations of toxæmia. The other cases, which were omitted, were complicated with sepsis, and the eye grounds presented additionally the changes of septic retinitis. The ophthalmoscopic condition found in his cases at the time of examination was that of neuritic atrophy. Whether a central scotoma was present at the beginning could not be determined as no case was seen in the early stage. The vision is frequently regained, sometimes it remains defective with peripheral contraction of the field, but in the most marked cases the eyes remain permanently blind.

H. G. G.

Optic Neuritis Due to Chronic Empyema of the Frontal and Anterior Ethmoidal Sinuses.

MURRAY, WILLIAM R., Minneapolis, (*Ophthalmic Record*, April, 1908), reports a case of optic neuritis due to chronic

empyema of the frontal and anterior ethmoidal sinuses which was referred to him in July, 1907, after a diagnosis of sinus empyema had been made. The subjective symptoms had been unusually severe and had extended over a period of one year.

The right nostril showed pus in the middle meatus and covering the anterior end of the middle turbinate bone; the middle turbinate was enlarged and oedematous; the left nostril, middle and inferior turbinates were moderately hypertrophied; the right frontal anterior ethmoidal and maxillary sinuses were chronically inflamed.

Examination of the eyes showed O. D. vision 20/100; optic neuritis, retinal veins congested and edges of disk blurred. The visual field was contracted for white and colors and exhibited a small central relative scotoma.. O. S. vision 20/30

On the date of examination the anterior half of a large oedematous middle turbinate was resected; two days later the anterior portion of the inferior turbinate was removed and a large and permanent opening into the antrum was made by removing a portion of the nasal wall of the sinus. One week later a modified Killian operation was performed on the frontal sinus and anterior ethmoidal cells. Ten days later the vision had become normal with a normal visual field. O. W.

The Relation of the Eye and the Nose.

PARKER, HARRY CALDWELL, Indianapolis, Ind., (*Ophthalmology*, April, 1908), says that the direct, open communication between the surface of the eye and the nose through the lacrimal canal makes easy transmission of infective material from one locality to the other and doubtless many infections are transmitted in this way. Mechanical obstruction along the canal or at its lower extremity is a frequent cause of disease of this organ. Through the intimate relation between the vascular system of the nose and eye, through the anastomosis of the ethmoid arteries, the branching of the ophthalmic artery, and by a collateral trunk along the nasolacrimal duct and by an equally intimate relation between the veins many bacteria may pass which may give rise to secondary inflammations of the eye. The reflex nervous conditions through the multiple distribution of the fifth nerve often give rise to inflammatory eye diseases as well as to pain and abnormal functioning. The accessory sinuses are being more and more recognized as

closely related to eye diseases. The close intercommunication between the various sinuses and the orbit and the thinness of the walls separating them make the transference of bacteriological material easy. In view of this close relation between the two organs it is essential that the nasal conditions should be closely studied in connection with the causation of a large variety of eye diseases.

A. F. A.

Report of the Pathological Examination of a Case of Acute Primary Glaucoma.

KNAPP, ARNOLD, (*Archives of Ophthalmology*, March, 1908), reports the case of a man 68 years old who was first seen on account of a failure of vision. The eye was inflamed, vision had been lost for one week and he had suffered great pain. The eye was enucleated and hardened in formalin. The vitreous appeared normal, the disk was slightly cupped, the retinal veins dilated and the lens displaced forward. Microscopically the iris was totally adherent to the cornea, the ciliary processes were free from inflammation, and the posterior chamber was filled with a semi-opaque, gelatinous fluid, which took the eosin stain. This was sharply separated by fibers of the hyaloid membrane and zonule from a coagulated mass in the anterior part of the vitreous body. Under the high power the canal of Schlemm was patent and there were no inflammatory changes about the iris angle. No lesions were found in the blood vessels of the ciliary bodies nor in the optic nerve. The coagulated mass in the anterior part of the vitreous consisted of a fine granular material, while next to the retina a more deeply stained fibrillary arrangement was found with a few epithelial cells scattered about. The writer believes the fine granular material described to be an exudate thrown out by the ciliary blood vessels, and as it was of such a character as to distend the posterior and obliterate the anterior chamber, it produced mechanically the increased tension. The writer further states, that if the aqueous humor contains an abnormal proportion of albumin in glaucoma, a sudden elimination or a sudden increase of this constituent might be regarded as the cause for some acute primary glaucomas, as this examination seems to indicate. Two years later the patient returned with an attack of acute glaucoma in the remaining eye, similar to

the first which yielded to an iridectomy preceded by a posterior sclerotomy.
H. G. G.

**Glaucomatous Excavation of the Lamina Cribrosa Without
Excavation of the Papilla and with Marked Papillitis,
in a Case of Acute Inflammatory Glaucoma.**

PUSEY, BROWN, Chicago. (*Archives of Ophthalmology*, March, 1908), reports a case in which a woman, 53 years old, was suffering from an acute inflammatory glaucoma of the left eye. She gave the characteristic premonitory history, with rapidly failing vision. An iridectomy was performed which was followed by a severe iridocyclitis. Six months later the swollen lens was extracted, leaving considerable lens matter behind, the removal of which was attempted later. A severe iridocyclitis followed this last step, and fifteen days later the eye was enucleated. Anatomically there existed in the anterior portion of the eye the conditions which mark an inflammatory reaction of subacute type; posteriorly there was a marked papillitis, and a marked cupping of the lamina cribrosa, but no excavation of the papilla. The nerve showed atrophic and inflammatory changes.
H. G. G.

Binocular Exophthalmos—Recovery.

RISLEY, S. D., Philadelphia, (*Ophthalmic Record*, April, 1908), reports the case of a colored woman, aged 40, who had been referred to him from the Wills Hospital clinic, on account of severe frontal pain, proptosis of both eyeballs and a roll of densely infiltrated and oedematous conjunctiva below. Both the lower lids were crowded away from the balls and the upper lids could be closed only with difficulty. There was a slight limitation of the motility of the left eye inward, and the exophthalmos and conjunctival oedema below were greater on the left side. The frontal pain had begun two months previously, had increased in intensity and was followed by the protrusion first of the left eyeball, and one month later of the right. An x-ray examination failed to show any proof of the existence of a collection of purulent material.

After a week of rapidly ascending doses of potassium iodide and mercurial inunctions she felt better; the proptosis rapidly diminished and a slight movement of the eyeballs reappeared.

Within three months the proptosis of the eyeballs had disappeared; the patient suffered no pain, and the fields, acuity of vision and ocular motility had recovered their normal conditions.

O. W.

Nail From a Shotgun Cartridge, Which Spontaneously Came Out From Under the Eyelid, Where It Had Been Lodged for Eight Years, Without Any Damage to the Patient.

FERNANDEZ, J. SANTOS, Havana, (*Archives of Ophthalmology*, March, 1908), reports the following cases: Two days before consulting the writer the patient had been injured by an exploding shot-gun cartridge loaded with white powder and shot. An examination showed only a slight bruise on the upper part of the right orbital border towards the external end. The vessels of the bulbar conjunctiva at the external angle of the right eye were slightly injected. Hardly any trouble was experienced by the patient. Twenty-five days after the accident treatment was suspended and the writer was again consulted, the patient complaining that he could not see well with the right eye. An examination did not confirm his opinion, each eye showing the maximum of sight at a distance, while nothing was discoverable in the fundus. Eight years later he was seen again, when he stated that during all this time he had not been troubled in the least, with the exception of flies that occasionally passed before his eye. The morning of the day on which the writer was consulted, before leaving his bed, the patient experienced, as on other occasions, a certain trouble in the right eye, this time a little more pronounced, with pain. Raising the right upper eyelid, something appeared to be coming out, finally falling upon the washstand. This proved to be the nail of a cartridge, such as are used in the LeFauchaux shot-guns. The nail was about 2 cm. long by 3 to 4 mm. in diameter. It had been lodged in the upper eyelid. The writer believes this case is unique in that it hardly caused the patient any trouble whatever, and had come out of itself, without the inflammatory reaction to be expected in such cases.

H. G. G.

The Relation of Eyestrain to Epilepsy.

HODSKINS, M. B., and MOORE, G. A., Palmer, Mass. (*Journal of Ophthalmology and Oto-Laryngology*, May, 1908), report as evidence the results obtained by keeping 88 epileptics under atropine for one month. The seizures were tabulated for four months previous to, and the month after the atropine month with the result that the number of seizures during the month the patients were under atropine was about the average. The idea was suggested to them by an article in the *Annals of Ophthalmology* in October, 1905, in which Dr. Gould wrote:

"In 1902 I proposed to the Superintendent of Craig Colony, the experiment of atropinizing the eyes of 100 young epileptics for 30 days. The test was not allowed. I believe it would be far more conclusive than the poorly conditioned test permitted. I hope some liberal minded physician or superintendent will some time conduct such a simple, harmless and easily carried out experiment."

The writers brought the matter to the attention of Dr. Flood, Superintendent of the Massachusetts Hospital for Epileptics, and permission being obtained, every possible assistance was given to make the test successful. M. L. F.

Vision and Refraction in Their Relation to the General Health, With an Improved Test Chart.

SCHULIN, CARL, Billings, Mont., presents a newly arranged test chart based on Snellen's measurements. He says "it became evident to me that all the charts now in use are defective in so far as the letters are not uniformly graded, especially the smaller sizes." The letters on the author's chart are of correct sizes. The reviewer wishes to extend his sympathy and his hope that the manufacturer of this chart will not in future vary from the standard. His own experience is that after the same discovery much hard work and success in obtaining accurately sized letters on a test card, the preparation of the cards passed from his control, and in a very short time the letters were of improper sizes and remained so in spite of his protests to the manufacturer. But the important part of the paper deals with the relation of refractive errors to the general health. The author does not believe that anomal-

ies of the refraction can produce general disease. He says, "By testing and recording and retesting from time to time the eyes and observing the general health of thousands of people, not only patients, but especially healthy ones, for years I have satisfied myself that no anomaly of the refraction can make a healthy person sick. Still, when a person has a chronic disease and at the same time an anomaly of the refraction, the latter aggravates the suffering, and properly adjusted glasses do not only improve the sight, but also the general health." The following statements are worthy of careful investigation, for if they are correct they show where the most of us have fallen short in our duty to our patients, and from a distinct advance in ophthalmology. "Donders' standard R_o and V 20/20 occurs only in elderly people. Young people, children as well as adults, with V 20/20, all have hypermetropia and a slight disturbance of the health. Perfectly healthy young people who are not myopic all have V at least 20/15, many even 20/10. Donders' standard is too short; the normal human eye has R+1.00 or more and V 20/15. V 20/15 is compatible with high-grade hypermetropia as long as the health is perfect. When the refraction is down to zero the vision is always a good deal below 20/20, it is at least 20/50, and myopia is established. All such youngsters are scrofulous. By stimulating treatment, rest of the eyes, and the use of atropine the progress of the myopia is often arrested." The real cause of asthenopia is not always easily recognized. He considers it due in great measure to auto-intoxication from other locally diseased parts of the body, and therefore this should always be searched for, found and treatment administered. "Healthy people have no asthenopia, whether they have anomalies of the refraction or not." There are a number of other points in this paper, but this one, of the relation between the eye and the general health is so valuable if true that it would seem better to impress it strongly and urge painstaking careful observation of many cases for many months to confirm it or prove it erroneous. M. L. F.

Defect of Abduction Associated With Retraction of the Globe in Adduction.

GREEN, J., St. Louis (*Ophthalmic Record*, February, 1908), reports a case of defect of adduction which has come under

his observation, the patient being a girl 9 years old. When she looked straightforward the left eye was enophthalmic 1 mm. and divergent about five degrees. Each eye diverged slightly under cover. Fixation was habitually with the right eye. Binocular vision was absent. Diplopia was not present in any portion of the field of fixation. There was a considerable difference in the width of the palpebral fissures: When the eyes were directed to the right the right eye made a full excursion to the right, its palpebral fissure becoming wider. The left eye turned fifteen degrees to the right in the horizontal plane and then shot obliquely up and in. Simultaneously with this movement the eyeball receded into the orbit and the palpebral fissure became narrower. When looking up and to the right the left eye turned straight up; when looking directly upward the left eye was turned obliquely and to the left, and so on in looking in all directions except down and to the left, there was a marked difference in the rotation of the two eyes.

After cocainization the tendon of the left internus was firmly grasped by a fixation forceps and the globe easily rotated outward until the outer angle overlapped the corneal limbus. A similar attempt was made to rotate the globe inwards by grasping the tendon of the externus, but this was only partially successful, as the patient complained of pain and tension.

O. W.

Camphor Water and Cherry-Laurel Water in Collyria.

SPALDING, J. A., Portland, Me. (*Archives of Ophthalmology*, May, 1908), calls attention to the irritating effects produced by some of the simple collyria commonly in use and has determined that this is the result of different methods of preparation, some good and some bad. Camphor water prepared according to the latest Pharmacopoeia: the alcohol should be allowed to evaporate completely before the powder is dissolved in the water. In addition, the camphor water should not be allowed to become part of any collyrium until a whole month has elapsed, to get perfect solution of the camphor and talcum. As regards cherry-laurel water, if this vehicle is simply the imported and distilled water furnished with a small definite percentage of hydrocyanic acid, it is free from irritative qualities. But if it is compounded according to the Dispensatory, from essential oils of bitter almonds, cherry-laurel or peach

pits, the result is much inferior in purity and the irritant qualities are very noticeable. The writer believes that this matter should be investigated.

H. G. G.

Remarks on Vibratory Massage in Eye Diseases.

CONNOR, LEARTEUS, Detroit, Mich. (*Ophthalmology*, April, 1908), says that every ophthalmologist uses massage of varying quality, from digital rubbing to deep vibratory mechanical pressure, both with and without medicaments, more particularly in chronic corneal or conjunctival disease, even in the hope of dislodging obstructions in the retinal vessels. Following vibratory massage of the eyeball we observe reduced tension, improved vision, greater clearness of the media, enlarged retinal vessels, more equalized circulation—effects only explained by assuming that there has been an augmented flow of lymph and venous blood with new formation of lymph and aqueous humor. Every observation points to an equalization of functional irregularities in motor, sensitive, special and vasomotor nerve fibers. In such cases as chronic thickened conjunctiva, early incipient cataract, scleritis and episcleritis, recent chorioiditis, retinal anaemia, optic nerve anaemia or atrophy and even functional disorders resulting from eye strain are benefited by vibratory massage.

A. F. A.

Additional Observations on the Use of the Ocular Transilluminator (The Wuerdeman Lamp).

WUERDEMAN, H. V., Milwaukee (*Ophthalmic Record*, April, 1908), gives additional observations on the use of his ocular transilluminator. He says it is the size and shape of a fountain pen and is manipulated in the same way, its miniature, lens-capped lamp being its essential feature, as the illumination by it is three and a half times that of an ordinary lamp, the light being condensed right over the filament. It requires but one volt of electricity, and it gives as much light as the larger instrument of Sachs. Another feature is, that as this lamp is so small and made of a slowly heating metal, it is not apt to get hot. Its use for oblique illumination of the anterior part of the eye is much more satisfactory than the ordinary method of using a condensing lens, and in operating for discission of cataract and even for extraction of cataract or iridectomy the

focal illumination is of much value, as it can be brought very close to the field of operation.

In conclusion the writer claims that transillumination of the eye is a necessary adjunct to the dark room examination.

O. W.

Notes on Transillumination of the Eye.

FRIDENBERG, PERCY, New York (*Archives of Ophthalmology*, May, 1908), prefers the Würdemann instrument because it is very light, easily managed with one hand, does not become hot, and takes up little space. Where the media are fairly clear the light is quite sufficient. An obstruction to light which is not very dense or thick, as, for instance, a small pigmented tumor, may cast a shadow on examination with this instrument, while more intense light would penetrate it and mislead the examiner. The Sachs instrument he has found valuable where extra illumination is needed, as in dense opacity of the media with a slight diminution of brilliancy without actual shadow. We get a better reflex when the illuminating pencil is applied far back near the equator, and pointed forward toward the anterior segment. The observer should look into the pupil in a line with the patient's gaze.

H. G. G.

A Simple and Effective Instrument for Cauterizing Corneal Ulcers.

TODD, FRANK C., Minnesota (*Ophthalmic Record*, April, 1908), describes an instrument for cauterizing corneal ulcers. From the illustration the instrument appears to be of convenient size, with a point projecting from a bulb on which there is also a blunt protuberance. The bulb is of copper, and the point of platinum, and will remain sufficiently hot to cauterize for several minutes. The point is intended to be used on a small surface and the protuberance on a larger one.

O. W.

Insufficient Pigmentation as a Cause of Eye Diseases.

WOODRUFF, CHARLES E., Fort Wadsworth, N. Y. (*Ophthalmology*, April, 1908), says that all animals are protected from excessive light. They either hide in the daytime or are covered by hair, feathers or an opaque pigment. The long light waves, infra-violet, are only capable of increasing the thermal move-

ments of molecules, and the short waves, from violet up through the ultra-violet, set up intra-molecular motions of the atoms which at first stimulate, then paralyze, and finally, if strong enough, actually disrupt the molecules. Without an exception, living tissue is so placed as to receive sufficient infra-violet vibrations and be protected from excessive ultra-violet ones. Long ago, these facts were used to prove that man also needed protection and that by the ordinary laws of selection of the darker types and destruction of the lighter, a race became pigmented in direct proportion to the intensity of light. For a considerable time it has been known that sufferers from tuberculosis promptly perished in the heat and light of the tropics and also that the outdoor treatment of this disease shows the best results in the cold and darker climates of the north, and better during the winter than during the summer months, also, that the brunette does better than the blonde type. In Scandinavia and the northern part of the British Islands and around the Baltic, blonde types are perfectly healthy, but if that type wanders into the sunlit climes of the south he suffers in time. The albino, who exaggerates what is found in a minor degree in the blonde, suffers most of all. Nystagmus and photophobia and many severe headaches are most common among those of deficient pigment and those exposed to excessive light. It is known that amber-colored glasses which cut out some of the irritating red and violet rays are far more successful than smoked glass, which by excluding the visual yellow rays only increase the strain of seeing. The pigmentary diseases of the retina and chorioid are said to be more common in light countries than in dark ones, and among the blondes of the sunny countries, but not among the tow-headed denizens of Scandinavia, where the light is not strong enough to cause this result. It is now proved that the first effect of light which is not too strong to be lethal is stimulating and the nerves so treated are hyperaesthetic. The same results must occur in the retina. For example may be quoted the well-known chorioiditis of owls and other nocturnal birds and animals exposed to day glare in our zoological gardens. These suggestions are put forward to persuade ophthalmologists to revise some of their notions as to the causation and cure of certain eye diseases due to excessive light, or at any rate to provoke thought and investigation along these lines.

A. F. A.

A Contribution to the Knowledge of Xeroderma Pigmentosum.

VELHAGEN, DR. C., Chemnitz (*Archives of Ophthalmology*, March, 1908), reports four cases of this rare and interesting disease. The clinical history, which is of great importance in this affection, showed that the grandfather of the children was still alive and in good health; the grandmother died at the age of fifty. The grandparents on the mother's side were both living at an advanced age. The father of the first two patients died at the age of forty-two, of what was said to be nephritis. The mother, aged 41, was perfectly well. Four children in all were born of this marriage, one of these, a boy, died at the age of 4 years of a heart lesion; the other, now 14 years of age, is perfectly well and normal in every respect. Of the mother's sisters' children one died at the age of 12 of xeroderma pigmentosum. A boy of 17 and a daughter of 21 are healthy in every particular. Two other daughters, however, aged respectively 14 and 24, are affected with typical xeroderma. Another sister who married is perfectly healthy, and has three healthy sons and two healthy daughters. Of the four brothers, two have healthy children, and one has none; one is unmarried. The fourth is also married, and is said to have eight healthy children. Both families are of Jewish race, but there is no blood relationship between them as far as they know their genealogy. The writer sums up his cases as follows: Three brothers X marry three sisters Y. Among the children of two of these couples five cases of xeroderma are found; not a single one among the offspring of the third union. As another Mr. X married outside of the Y family, and three Y sisters married men who were not related to the X's without xeroderma appearing among their children, we cannot decide whether the germ of the disease is in the X family or in the Y's. It also appears that there must be some factor besides that of sex-union of an X and a Y to determine the development of xeroderma in the offspring. The history of the first two cases speaks strongly in favor of the sunlight theory, provided always that the data were not suggested to the mother in the course of repeated questionings. The more virulent course of the disease in the elder daughter might be explained by the presence of numerous congenital

naevi. Besides it has been noted that congenital disease is always more marked in the first born. In the two pairs of cases there were certain striking differences—for instance, in the first, hyperkeratosis and wart formation was a marked feature. The most intense formation of pigment, on the other hand, was noted in the second pair, particularly in the case of the younger sister. In substance the clinical picture of the cases was as follows: After the children had been carried out into the open air numerous small, red dots appeared on the uncovered parts of the neck, hands and forearms, as if the skin had been pricked with needles. Soon after, innumerable dark, brown freckles appeared on the parts above mentioned. The freckles gradually became so numerous that hardly a spot of normal skin remained between them. After several years, areas of white appeared between the pigment spots, in the neighborhood of which large blood vessels developed of sufficient size to be noticeable to the lay eye. These areas gradually increased in number and extent. There was also a marked roughness of the skin which fell off in small and large scales with ulceration at many points on the face and neck. These gradually healed so that eventually no trace was left, except a large parchment like, but not indrawn scar. The most annoying symptom was the photophobia from which they suffered after the first appearance of the freckles. Later on marked laceration supervened,, and vision became affected.

H. G. G.

ABSTRACTS FROM ENGLISH OPHTHALMIC LITERATURE.

(GREAT BRITAIN AND THE ENGLISH COLONIES.)

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A Case of Chiasma Lesion, Which Improved Under the Administration of Thyroid Extract.

FISHER, J. HERBERT (*Ophthalmic Review*, April, 1908).
The author reviews a case of Acromegaly reported by Richardson Cross in *Brain*, Vol. xxv., part 2, p. 341, of a boy, aged 23 years, who was under observation five years, with charts of the fields of vision.

The symptoms of acromegaly were typical. When first seen the left field presented a large scotoma in the upper temporal field. Vision W. C. = 6/24. Right eye field normal. Vision W. C. = 6/9. Two years later—vision in left eye reduced to l. p., right eye 6/18 with large loss of temporal field. Both optic disks were pale and atrophic. The treatment consisted in the administration of thyroid

tabloids, each equivalent to 5 grains of fresh gland per diem, together with fresh thymus gland. Marked improvement in the general symptoms was soon observed. Two months later the treatment was altered to two tabloids of pituitary extract and one of thyroid extract daily. In nine months the patient was reduced in weight about 24 pounds. After three years' treatment the field of vision in each eye had become "almost full" when tested with a large, white spot although the defective spot in right fields continued, though somewhat diminished in size. This was thought to be due to a slight pressure on the left optic tract, maintaining an incomplete homonymous hemianopia.

In the above case the pituitary body tumor involved the chiasma, nerves and tracts asymmetrically and involving first the left side, and later the decussating fibers from the right nerve. The latter under treatment almost fully recovered; the macular fibers from the left eye were permanently damaged. The partial right hemianopia is explained by slight implication of the left optic tract.

The author reports a case similar to above. A case of a young adult. When first seen he presented none of the general signs of acromegaly, one eye was practically blind and the other visual field was typically that of a complete hemianopia; the nasal field was alone preserved. The history of the case showed that the blind eye had first gone from the temporal side of the field. The history of one eye together with the findings in the other located the lesion in the chiasma.

The case was treated with thyroid extract alone—anti-syphilitic treatment had been very thoroughly carried out, but the eyes had progressively deteriorated. There was no history of syphilis, nor of any acquired venereal disease. "Allowing for the fact that the fibers of one optic nerve were probably atrophic beyond recovery, the case appears to show that thyroid extract alone is an adequate remedy for some forms of pituitary body hypertrophy, and that the products of the pituitary body and the thymus gland are, in some cases at least superfluous; it seems therefore to carry us a very short step further in the treatment of such patients; that administration of thyroid products will supply the economy with something which the pituitary gland,

by excessive efforts, is endeavoring to provide, appears to be a simple explanation of the good effects of this treatment; it would be interesting to know whether pituitary extract will cure the symptoms of myxedema, or have any effect in cases of simple hypertrophy of the thyroid gland—if there were any good results obtained by such converse clinical experiments, the associations between the two glands and their functions would be brought still closer.”

Cases of myxedema accompanied by bi-temporal hemianopia have been described, in which a compensatory hypertrophy of the pituitary body has been invoked to explain the usual defect, and in some cases postmortem examination has confirmed the accuracy of the explanation.

Experimental extirpation of the thyroid gland has been shown to cause hypertrophy of the pituitary body in animals. Clinically, cases presenting symptoms which are a complex of acromegaly and myxedema, have been cured with thyroid extract.

After giving the development of the pituitary body the author adds a detailed history of his case.

The treatment consisted in the administration of 5 grains of thyroid extract twice daily for two years. After eight months, vision in right eye was 6/9 pt. and the fields had increased to 30° temporal contraction. Right eye vision nil.

W. R. P.

An Improved Form of Artificial Eye.

GROSSMAN, KARL (*Ophthalmic Review*, April, 1908). The author suggests adding a protrusion to the artificial eye corresponding to the part of the lid that sinks in most. Each eye being adapted to the individual case. He is “uncompromisingly” in favor of enucleation, and not for Mules’ or similar operations. He suggests that where possible the patient should be sent to a glass blower. The color could be matched and the shape of the eye could be made to conform to the individual cavity. By united efforts centers could be established where the glass blower could meet patients at stated times.

W. R. P.

Cerebellar Tumor With Proptosis.

PARKINSON, J. PORTER and HOSFORD, J. STROUD (*Ophthalmic*

Review, May, 1908). After calling attention to the extreme rarity of proptosis occurring in cases of cerebellar tumor, or more properly in cases of tumor in the posterior fossa of the skull, the authors give a full report of a very interesting an instructive case.

The patient was a well developed girl aged 14 years. She had a history of pains in limb and back, with headaches and sickness, and was treated for "rheumatism."

During the month before admission to the hospital she had had two convulsions and began to "see things in a mist" followed by diplopia and her mother noticed that "her eyes began to grow out." The pains had disappeared, but the eyesight became very much worse with giddiness on sitting up.

She was brought to the hospital "for spectacles" but she could not walk or even stand without leaning on her mother's arm. Her face was expressionless, the head thrown back and the posterior muscles firmly contracted. There was no knee jerk, nor was Kernig's or Babinsky's sign, or ankle clonus to be obtained. Sensation was normal, memory good, taste and speech natural. The right arm was decidedly weak, both in grip of the hand and the forearm muscles. The eyes showed great proptosis, equal on the two sides. Lids and conjunctiva were normal. There was well marked paresis of the right external rectus muscle, and slight loss of power in the left. Slight but definite horizontal nystagmus. Altitudinal motions were normal. Von Graefe's and Stellwag's signs were absent, but Dalrymple's sign was present. The pupils were equally dilated to 8 mm. and reacted very faintly and slowly to light. The tension was normal and media clear.

Each nerve showed a most marked choked disk. Right 4 mm., left 3 mm. accompanied by hemorrhages. In the macula of the right eye there was a somewhat stellate whitish mass of exudation. Vision was reduced to counting fingers. Temperature subnormal; urine normal. Treatment consisted of administration of mercury and iodides.

The patient continued in much the same condition until about five weeks before death, when she had fits of a general convulsive order, not severe but accompanied by a

slight loss of consciousness. These continued at intervals of a day or two without headache or vomiting until a week or two later. The attacks increased in frequency until death which occurred three weeks later.

Following is the report of the postmortem findings:

Postmortem.—*Much emaciation.* Proptosis not quite so marked as before death, but still very pronounced, although the eyeballs could be pressed back into place. Convergence of each eye. No sign of separation of the cerebral sutures, or alteration of bony orbit.

On opening the cranium the meninges were natural, but there was an escape of a great quantity of intra-ventricular clear fluid. The ventricles were much dilated, and the cerebral cortex flattened and thinned and tunics of nerve sheath distended. The orbit was natural. Attached to the pia-mater on the under surface of the right lobe of the cerebellum was an irregular, flattened, well circumscribed, encapsulated, very firm, pink growth, about the size of a large pigeon's egg, and containing old blood clot in the center. It pressed upon the restiform body and medulla oblongata on the right side, dipping down so much into the foramen magnum that a piece of the tumor was left behind by the pathologist during the process of removing the brain.

The whole growth appeared to have been wedged between the bony wall and the right side of the medulla.

Microscopical examination showed the growth to be a fibro-psammoma. There was a small P. M. clot in the right lateral sinus far back. The other organs in the body were natural.

W. R. P.

On Retinitis Pigmentosa and Allied Diseases.

(Abstract continued from ANNALS OF OPHTHALMOLOGY, 1907, page 516.)

NETTLESHIP, E. (*Royal London Ophthalmic Hospital Reports*, January, 1908). In discussing some of the exciting causes of retinitis pigmentosa the author states that it is the result of a tissue liability present though seldom manifest at birth and known to be so often hereditary that we may be sure it is so also in many cases where proof is wanting. It is probable that the first changes will be found in the coats of the small chorioidal arteries.

We know from experiments that section of one or more of the posterior ciliary arteries is followed by opacity passing into atrophy and finally pigmentation of the overlying portion of the retina, the pigment being derived from the pigmented epithelium and the whole change being due to atrophy of the chorioid following permanent interception of its blood supply.

Several cases have been reported in which the ophthalmoscopic appearances are described at periods from three weeks to seven months after operations for removal of tumors behind the eye ball. Pigmentation of the retina was a marked feature of all. Pigmentation anatomically resembling that of retinitis pigmentosa is often found in eyes that have been blind for a long time from disease of the anterior segment of the globe; such eyes are glaucomatous and the retinal pigmentation is a consequence of atrophy of the chorioid from prolonged increase of tension.

Practical question are, first: whether an hereditary tendency to disease of small arteries, say those of the chorioid, may in favorable circumstances remain latent throughout a lifetime? and, secondly: whether any constitutional conditions can act as exciting causes and evoke the changes leading to retinitis pigmentosa in persons some of whom might otherwise have escaped?

An hereditary tendency that remained latent would, or might, account for the atavism not infrequently observed in family histories of retinitis pigmentosa. Such latent tendency brought into action by hemorrhage or infectious illness may explain the puzzling cases now and then met with where only one member of a large childship suffers. There is reason for believing that mere loss of blood may in rare instances rival actual division of ciliary arteries in its results and lead to, or greatly intensify atrophy of the chorio-capillaris and pigmentation of the retina. Such general causes as toxic illness and loss of blood may be supposed capable of operating either by lowering the power of resistance to an already existing dormant tendency or by inducing independent vascular disease, and probably both processes may sometimes be at work together. It may even be that certain toxic substances produced in the body have selective affinity for the chorioidal arteries, as quinine has for those of the retina.

Three cases are then reported in detail in which copious rapid hemorrhage was believed to have been responsible for inducing or stimulating the progress of retinitis pigmentosa. A number of cases have been reported in which the retinitis pigmentosa is apparently caused or accelerated by acute exanthemata or other illnesses. If an infectious disease can bring about changes in the chorioidal vessels the same may be true of such chronic fevers as syphilis and tuberculosis. A history of phthisis is common in these families of retinitis pigmentosa. He reports from his own practice one case of retinitis pigmentosa affecting only one eye and quotes others from literature. W. E. B.

(To be concluded.)

Visual Fields in Retinitis Pigmentosa.

HEPBURN, MALCOLM L. (*Royal London Ophthalmic Hospital Reports*, January, 1908). The characteristic feature in the fields of retinitis pigmentosa is the presence of the ring scotoma. This defect is also frequently noticed in many other affections of the eye, but in none is it so universally met with as in pigmentary degeneration of the retina. The peculiarity in the field which he especially wishes to emphasize is that there are small islands of vision or relatively functional areas scattered throughout the scotoma, and in addition he calls attention to (1) the fairly constant position and extent of the central visual portion which does not seem to diminish perceptibly under ordinary illumination until the extreme periphery has entirely lost its function; (2) the few additional scotomata in the visual areas; (3) the occasional formation or tendency to formation of the double ring scotoma, and (4) the irregularities of the scotoma itself though always attacking a well-defined region in the retina. He cites six cases giving charts of their fields. In regard to the pathology he mentions that roughly speaking there are two main theories, one which ascribes the defect to some affection of the optic nerve and more especially that bundle of fibers which supplies the intermediate zone of the retina; and the other which regards the special arrangements of the vascular supply in this region as rendering the vessels easily liable to disease or partial blocking of their lumen. After discussing the rela-

tive merit of these theories he arrives at the following conclusions:

1. In most of the cases of retinitis pigmentosa which I have examined there are found islands of vision, or relatively functional areas, scattered throughout the ring scotoma.

2. The manifestation of retinal activity in this particular part of the field is more in conformity with the vascular theory brought forward to explain the existence of the ring scotoma.

3. There are some grounds for believing that, in an emergency, when the circulation from one system (viz., short ciliary vessels) is cut off, a part of the retinal circulation is capable of enlarging in order to take its place and preserve the function of some parts of the retina.

W. E. B.

Hereditary Optic Atrophy (Leber's Disease).

HANCOCK, W. ILBERT (*Royal London Ophthalmic Hospital Reports*, January, 1908). The author reports in detail the history of a case and adds a description of twelve afflicted members in the family tree. Of the twelve members attacked six have practically recovered their sight and one is said to have commenced to improve, a most unusual proportion of recoveries. Complete blindness in this disease is extremely rare, the peripheral field as a rule remaining good. With one exception all these cases acquired the disease in or about the third decade of life. Usually males only are attacked. When females are affected it would appear that in the large proportion of cases they acquire the disease at or about the climacteric. Only males are affected in the family quoted and the disease is transmitted through the female line. Consanguinity has played no part and in no single instance in the above family tree has there been intermarriage with blood relations. Tobacco and alcohol had little or no influence on the disease.

W. E. B.

Pathology of Coloboma at the Nerve Entrance.

COATS, GEORGE (*Royal London Ophthalmic Hospital Reports*, January, 1908). Ophthalmoscopically, it takes the form

of a deep pit, often measuring several times the diameter of the normal disk. Smaller secondary excavations are often present in its floor. The retinal vessels emerge from its depths with a variable arrangement and bend sharply at its overhanging edge. With regard to the arrangement of vessels, the classification of Caspar is usually adopted:

(1) The lower part of the coloboma is most deeply excavated, and from it the vessels spring. Their general direction is upwards, so that those destined for the lower half of the fundus must make a sharp bend downwards over the deeply excavated lower edge. The superior vessels, on the other hand, take a more direct course to their destination over the less excavated superior border.

(2) The vessels arise with something like their normal arrangement either from the center of the coloboma, or from a point towards its upper border.

(3) The vessels emerge separately from one another at some distance from the center of the excavation, or even quite at its edge. In the latter case the retina appears to be entirely supplied by cilio-retinal branches.

It is customary on clinical grounds to draw a distinction between "Coloboma of the Optic Nerve" and "Coloboma of the Chorioid adjacent to the Nerve." In the latter the defect has the more or less triangular shape common in colobomata of the chorioid elsewhere, and though it may touch, encroach on, or even engulf the papilla, yet the boundaries of the latter are fairly distinct, and separable from the floor of the colobomatous area. In "Coloboma of the Nerve," on the other hand, an enlargement and excavation of the nerve itself are simulated, although, as stated, some part of the excavated area may be indefinitely distinguishable by its pinker tint or by the distribution of the vessels, as the probable situation of the entering nerve fibers. This appearance may be absent, however, so that the papilla appears to be replaced by a deeply excavated area which may be as much as twenty times the normal diameter of the disk.

The author first gives a brief abstract of the published cases and adds in detail three cases of his own, including careful microscopic examination. A review of the literature warrants the statement that the lesions even in cases which

closely resemble each other clinically present no uniformity microscopically, and except within narrow limits it is impossible from the ophthalmoscopic appearances to predict what the microscope will reveal. Pathologically the cases may be classified in three divisions:

(1) The lesion is a coloboma of the chorioid beneath the nerve, the nerve itself being normally formed, and sharing only passively in the deformity.

(2) The lesion is a coloboma of the chorioid and nerve.

(3) The lesion is a coloboma of the nerve alone, the adjacent chorioid being normal.

Classification of some of the cases is doubtful and when the coloboma is large is very difficult.

It is evident from the study of these cases that the distinction between "coloboma of the nerve" and "coloboma of the chorioid adjacent to the nerve," though quite reasonable on clinical grounds cannot be maintained on pathological. Most of the "colobomata of the nerve" are colobomata of the chorioid adjacent to the nerve. Coloboma confined to the nerve is a much rarer form of defect, only three unequivocal examples are to be found in literature. The three cases which the author adds were of this type, true colobomata of the nerve alone, with the adjacent chorioid normal. In regard to the condition known as Fuchs's coloboma or inferior crescent, he concludes that inferior conus and coloboma at the nerve entrance are distinct entities though it may be impossible to differentiate them in all cases with the ophthalmoscope. If the floor is much sunk below the level of the surrounding fundus and if the defect is large and of bizzarre form, these are points in favor of coloboma as against crescent. Such examples of typical inferior conus as have been both seen ophthalmoscopically and submitted to pathological examination have presented much greater resemblance to ordinary myopic crescents than to the coloboma at the nerve entrance, nor is the difference merely one of degree. It is not justifiable therefore to speak of inferior conus as a minimal form of coloboma at the nerve entrance.

W. E. B.

Congenital Pigmentation of the Papilla.

COATS, GEORGE (*Royal London Ophthalmic Hospital Re-*

ports, January, 1908). No case in literature seems to be in all respects similar to this. Three possible explanations suggest themselves to the author: (1) sarcoma; (2) pathological pigmentation; (3) congenital pigmentation. He eliminates the first two for the congenital character. Cases of congenital pigmentation of the papilla fall into two main classes: (1) Isolated small black spots which are probably not very rare. They are small sharply circumscribed, usually round or only slightly elongated and neither raised nor depressed. They occur indifferently in any part of the disk. No other congenital abnormalities are usually associated with them and vision is perfect. (2) Pigmented "crater-like holes." The chief objection to this view is that instead of an excavation a swelling was found.

The evidence seems to him to point to a congenital massing of the pigment epithelium by the side of the nerve entrance, or possibly to a simple congenital tumor of the chorioidal stroma pigment, or melanomata of the chorioid encroaching on the disk. He inclines to favor the latter view because of the soft edges and the appearance of veiling of the periphery by neighboring structures downwards and inwards. A colored plate accompanies the paper.

W. E. B.

Lacrimal Abscess in the New Born.

MAYOU, M. S. (*Royal London Ophthalmic Hospital Reports*, January, 1908). The author has recently had the opportunity of treating eight cases of this disease and in connection with them has worked out some points in the development of the lacrimal canals in the foetus, with their condition at birth and has made some experiments with regard to the production and position of the abscess. He arrives at the following conclusions:

1. That throughout development, the lower end of the lacrimal duct is extremely small, and remains so at birth, being partially occluded by the pressure of the inferior turbinated bone.

2. That the duct at birth is filled with debris both from the sac and the canaliculi.

3. That at birth the duct is either not patent at all, or only partially so.

After the birth of the child the nose soon becomes cleared of debris, probably by aspiration, but in the case of the lacrimal duct the process probably takes much longer, especially as the lower end is so small and is partially occluded by the inferior turbinate. In cases of this variety of congenital lacrimal obstruction the aspiration from the nose probably fails to clear the duct.

This is further borne out by the clinical fact that, if one of these cases of lacrimal obstruction in infants be seen before an abscess forms, one careful passage of a probe is generally sufficient to effect a cure.

If infection of the sac wall takes place in one of these cases of lacrimal obstruction, an abscess forms. This frequently takes place owing to the liability of infants at birth to infection of the conjunctival sac, the debris making an excellent medium for the growth of organisms.

The peculiarity of a mucocele is the large size which it reaches without showing much external sign. It is liable to be mistaken on superficial examination for ophthalmia neonatorum but the true nature is readily revealed by pressure over the lacrimal sac.

The following organisms were found in the purulent discharge from these cases: (1) *Gonococcus*; (2) *staphylococcus*; (3) *pneumococcus*, and (4) *Morax-Axenfeld bacillus*. The treatment adopted was to cleanse the sac and pass a probe.

W. E. B.

Sympathetic Ophthalmia; Some Anatomical Considerations, with Special Reference to the Occurrence of Plasma Cells.

McILROY, JANIE HAMILTON (*Royal London Ophthalmic Hospital Reports*, January, 1908). The author starts in by giving in considerable detail an account of Fuchs' work on sympathetic ophthalmia. While Fuchs mentions certain cells corresponding to the author's plasma cells, no importance is allotted to them. Since in all chronic inflammations of the tissues, the plasma cells plays a very large part, the author examined cases of sympathetic ophthalmia and made quanti-

tative estimation of the plasma cells in each to ascertain whether it was a feature of any importance in such inflammation. For comparison he examined a number of cases of non-sympathetic ophthalmia.

The term plasma cell is now universally applied to pathological cells. The cell has an oval rather sac-like protoplasmic body. The nucleus is rather small, rounded, and almost invariably excentric. The chromatin granules are prominent, and are arranged in a typical radiate (cart wheel) fashion. Mitosis is frequent, and several nuclei may often be seen in one cell. The cells are distinctly basic in reaction, and thus with Pappenheim's stain the cell-body is red, whilst with haematoxylin it is purple. He has practically never found granules in the protoplasm. There is some dispute in regard to their origin, whether they originate from tissue cells or from lymphocytes. They have been found in abundance in all chronic inflammation of the body; particularly in the so-called infective granulomata (tubercle, syphilis) where they constitute a large proportion of the infiltration. They are generally absent in the acute or suppurative forms, and their presence is generally looked upon as an indication that the tissues in which they occur possess a certain amount of resistance to the toxin which is causing the disease.

He gives the results of his study of twelve cases of sympathetic ophthalmia, seven the exciting eye and five the sympathizing eye, and of ten cases of non-sympathetic iridocyclitis, and concludes that the plasma cells are on the whole greater in number in the sympathetic than in the non-sympathetic cases. The plasma cell is seen in greatest abundance in the sympathizing eye. The optic nerve, ciliary vessels and nerves are practically free from any infiltration whatever.

W. E. B.

Fate of Eyes that Have Been Submitted to the Operation of Extraction of a Foreign Body by the Electro-magnet.

GOULDEN, CHARLES (*Royal London Ophthalmic Hospital Reports*, January, 1908). Several methods of operating are in use at Moorfields. The commonest procedure is to drag forward the foreign body into the anterior chamber, or disentangle it, by means of Haab's giant magnet and then to make

an incision in the cornea with a keratome or broad needle in a position diametrically opposite the foreign body, and half-way between the corneo-scleral margin, and the edge of the pupil, and then to introduce the terminal of the small magnet or magnetized spud, and so remove the foreign body. This method is not only used for cases in which the foreign body is situated in the vitreous, but also to release those embedded in the iris or lens.

Another plan, after drawing the foreign body forward with the Haab magnet, is to make a peripheral incision with a keratome, and in this way introduce the terminal of the small magnet.

To this procedure there are three serious objections:

(1) The possibility of prolapse of the iris and the need of an iridectomy, which is practically a certainty in those cases in which the foreign body is entangled in the iris.

(2) The possibility of subsequent adhesion of the iris at its base to the wound, which it is almost impossible to release.

(3) The bruising of the tissues and greater difficulty in operating, due to the fact that, compared with the range offered by a corneal incision, a much smaller peripheral incision is used from fear of a prolapse of iris; that although a very peripheral incision is planned, it is seldom so peripheral as anticipated, and consequently a ridge is left, formed by the lower lip of the incision, against which the foreign body can easily be caught.

A third method applies only to foreign bodies situated in the vitreous, and that is the plan of puncturing the sclerotic radially (to avoid injuring blood vessels as far as possible), and then to introduce the terminal of the small magnet immediately over the situation of the foreign body. This method is only applicable after an examination and localization by means of the x-rays.

This paper as a study in prognosis in these injuries is based upon forty-two cases which have been carefully examined at a period not less than one year after extraction (or attempt at extraction) of the foreign body. After giving a history of all the cases, in drawing his conclusions he divides them into two main groups:

(A) Cases in which the foreign body was removed by way of the cornea.

(B) Cases in which the foreign body was removed by scleral puncture.

In regard to the ultimate result or vision obtained he divides the cases into three groups:

(a) Vision of at least 6/12 and not capable of further improvement.

(b) Vision of less than 6/12, and capable of further improvement by operation as, for example, the needling of an opaque membrane or the extraction of an opaque lens.

(c) Vision less than 6/12, and not capable of improvement. This group includes the cases in which vision has been almost or quite lost, but in which excision was not thought necessary.

(A) Cases in which the foreign body was removed through the cornea or corneo-scleral junction.

Path of entry through the cornea or corneo-scleral margin.

1. Foreign body situated anterior to the vitreous with the lens uninjured. Five cases.

Results according to the schedule above:

(a) Five cases = 100 per cent.

(b) No cases.

(c) No cases.

2. Foreign body situated anterior to the vitreous with the lens injured. Twelve cases.

Results:

(a) Six cases = 50 per cent.

(b) Three cases = 25 per cent.

(c) Three cases = 25 per cent.

3. Foreign body situated in the vitreous with the lens uninjured. Six cases.

Results:

(a) Five cases = 83.4 per cent.

(b) No cases.

(c) One case = 16.6 per cent.

4. Foreign body situated in the vitreous with the lens injured. Ten cases.

Results:

(a) Five cases = 50 per cent.

(b) Three cases = 30 per cent.

(c) Two cases = 20 per cent.

(B) Cases in which the foreign body was removed from the vitreous by scleral puncture.

I. Path of entry through the cornea or corneo-scleral margin.

1. Lens uninjured. Three cases.

Results:

(a) No cases.

(b) No cases.

(c) Three cases = 100 per cent.

2. Lens injured. Two cases.

Results:

(a) No cases.

(b) No cases.

(c) Two cases = 100 per cent.

II. Path of entry by sclerotic, and removed either through wound of entry or scleral puncture.

Four cases.

Results:

(a) One case = 25 per cent.

(b) No cases.

(c) Three cases = 75 per cent.

In conclusion a few very striking features are apparent. In those cases in which the foreign body entered the eye by way of the cornea, almost everything depends upon whether the lens was intact or injured. In no case in which the foreign body was anterior to the vitreous and the lens uninjured was it found necessary to excise the eye, and in the cases of this series none gained less than 6/12 and many full vision. Again, those cases in which the foreign body was situated in the vitreous (having gained that situation by the same path) and the lens intact, give a better result than those in which the foreign body was embedded in the lens. The cases that give the ultimate worst result are those in which the foreign body entered the globe by the sclerotic, or in which a piece of steel was removed by scleral puncture. He adds a table of cases examined less than a year after injury and another table of the cases in which it is found necessary to excise the globe. The list of cases of excision teaches something and supports the fact that damage to the lens is an extremely serious complication in injury to the globe by foreign bodies.

W. E. B.

ABSTRACTS FROM GERMAN OPHTHALMIC
LITERATURE.

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The Influence of Iodide of Potash on Incipient Cataract.

VON PFLUGK, Dresden (*Graefe's Archives*, Vol. lxxvii, part 2 and 3). The results which Badal reported after several years' observation (see the full Bibliography for these and other references), were verified by other observers, and the claims which were modest at first have become more optimistic until now it is asserted that not only incipient cataract but more advanced senile cortical opacities may not only be delayed in their development, but that in some cases the lens becomes clearer and vision better after the systematic and prolonged local application of solutions of iodide of potash.

The author reports the results of numerous experiments on the eyes of many animals to show that iodide of potash in solution, injected under the conjunctiva, appears in ten

minutes in the aqueous and vitreous. Deutschmann had shown by means of the Palladium chloride reaction that three hours after giving iodide by the mouth to rabbits, it was present beneath the posterior capsule and neighboring cortex and the author's experiments convince him that it enters also through the anterior capsule, especially in the anterior star-lines (Linsennaht).

In order to make the experiments more convincing, naphthalin cataract was produced in rabbits and the results may be briefly stated as follows: The epithelium of almost all the lenses with naphthalin cataract, which were treated with solutions of potassium iodide of the proper dilution, was less changed than the epitheliums of the other eye of the same animal, which was not treated.

The second or clinical part gives in detail the extensive literature which has grown up regarding the action of iodide of potassium on the lens. The observations have been made briefly in France by Badal and his associates, but the field was not unexplored at a much earlier date.

In 1901 and 1902 Badal reported that he had succeeded by means of drops, eye-baths with iodide of potash or iodide of sodium, and sub-conjunctival injections, in delaying the development of incipient cataract. Later Badal recommended exclusively the use of iodide of potassium as a collyrium and as an eye-bath in increasing strength. The results reported were in early cases of senile cataract, such as those described by Hess as sub-capsular cortical cataract.

The author gives a resumé of all the cases reported since 1901 which have been subjected to this treatment, including 28 of his own cases which have not been reported previously. These comprise 73 cases in which there are sufficient data to arrive at some conclusions as to the efficacy of the treatment.

Other less careful observations from a number of sources are given, from which conclusions can be drawn with difficulty.

In five cases the author was able to make repeated sketches of the course of the cataract under treatment, and in those cases he observed the gradual disappearance of the opacity, the advanced opacities passed into those less satur-

ated, which became in turn indistinct, so that, in the end, they with baths and collyria.

The improvement in 59 cases of Badal's are given in percentages as follows: Great improvement, 8.63%; improvement, 14.65%; stationary, 62.06%; progress of the disease under treatment, 14.65%. These cases were treated solely with baths and collirium.

Another set of 46 eyes from the author's practice, treated by means of sub-conjunctival injections solely, give the following percentages: Great improvement, 54.25%; improvement, 28.21%; stationary, 15.19%.

The difference in the two sets of cases is certainly striking. None of the last series grew worse during the treatment. The duration of observation following the treatment is from one to five years. The directions regarding the sub-conjunctival injections in which a one-per-cent solution of iodide of potassium is used were given by the author in the *Klin. Monatsbl. f. Augenheilkunde*, 1906, Vol. 44, p. 400. A series of ten or twelve injections are given after which, the author asserts, a marked improvement may be expected.

It is stated that the procedure is entirely painless if the author's method is followed. If pain follows, a few drops of one per cent acoin oil (*Klin. Monatsbl. f. Augenheilkunde*, 1907, Vol. 45, p. 505) is instilled. In very few cases is there any complaint of irritation of the conjunctiva after the use of the collyrium or baths, which may be continued for months.

C. W. C.

Amaurosis Due to Felix Mas.

SCHOENING, Bonn (*Zeitschrift f. Augenheilkunde*, March, 1908, Vol. xix, No. 3). In a summary of the cases reported in literature of poisoning by the rhizoma felicis, it is shown by Nieden that in 81 intoxications 12 deaths followed, 19 cases developed permanent bilateral blindness and 15 cases unilateral blindness, 9 cases permanent diminution of the vision of both eyes and 4 cases unilateral permanent visual diminution, and 2 cases temporary diminution of the vision. Nieden himself observed in 3686 cases 3 cases of permanent blindness.

The causative factor of the toxemia is apparently unknown as the dosage, health and age of the individual, previous to illness, etc., have been different in each case.

The author reports a case occurring in a miner of apparently good health, just returning from military duty. He was given 10 gram. extract Felix mas (Merck) September 30th, and a second similar dose on October 2, followed by calomel and jalap.

On October 3 the patient complained of a mist before his eyes and reduction in visual acuity. Seven hours later the conjunctivae were light yellow, the pupils widely dilated and immobile. There was no light perception. The retinal veins were dilated and the arteries contracted.

On October 4th the disk edges were indistinct, the papilla slightly swollen, the veins being dilated and the arteries very narrow; slight edema of the retina. The patient complained of general weakness.

Later the macula lutea showed the following changes: In place of the foveal reflex there was a homogeneous pale red surface, upon which were placed fine light punctate spots. Above and below there was a peculiar striping in the peripheral third of the macula. The thin stripes were parallel and separated by the width of a main branch of the central artery.

The author believes them to be due to a folding of the internal limiting membrane caused by the edema.

In spite of treatment, the right eye remained blind, the left eye having 1/200 of normal vision. The author calls attention to the fact that in this case a strong man, who had not previously undergone any debilitating cures, was affected. He had undergone a similar treatment for tapeworm previously without harm, showing no idiosyncrasy. Light perception in the left eye returned after a lapse of 14 days, beginning in the periphery.

F. K.

Tumors of the Caruncula Lachrimalis.

A. GUTMANN, Berlin (*Zeitschr. f. Augenheilkunde*, Vol. xix, No. 1, January, 1908). The author reports three cases of papilloma of the caruncle, in one of which there had been a recurrence. The histologic examination verified the diag-

nosis in each case. He agrees in believing with Grunert that the chronic conjunctivitis and the persistent lachrimation accompanying these growths are simultaneous with the formation of the growth and not the cause of the same.

Gutman also reports a case of soft fibroma of the caruncle occurring in a 21-year-old workman. Typically it was a bullet-shaped mass, situated on the caruncle, separated therefrom by a narrow neck. Its surface was smooth, homogeneous, with no excrescences. It is characteristic, that a thickening of the caruncle exists for 1 to 1½ years before a sudden growth appears, and in one to two months the tumor may become as large as a bean or hazel nut.

F. K.

Experiences with Injections of Koch's Old Tuberculin in Diseases of the Eye.

SCHUMACHER, Kiel (*Zeitschrift. f. Augenheilkunde*, March, 1908, Vol. xix, No. 3). Of thirty-one cases of ocular disease in which the diagnosis of tuberculosis was certain, previous to the use of tuberculin, 100 per cent reacted generally, and in 60 per cent a local reaction in the eye was manifest. Seventy-seven per cent reacted after the first injection, generally consisting of 1 mgr. Included in this category were 7 cases of keratitis parenchymatosa, 4 cases of extensive corneal lesion associated with inflammation of the anterior uveal tract, 19 cases of disease of the uveal tract, one of iritis, with episcleritis, and one case of chronic fistular dacryocystitis.

In 10 cases in which tuberculosis was not suspected there was no reaction to tuberculin at the first injection, and in several of these cases there was no reaction after 4 to 10 mgr. injections. In two cases headache was complained of. In 24 cases the diagnosis between tuberculosis and hereditary syphilis was in question. In nine cases of bilateral keratitis parenchymatosa, hereditary syphilis as well as signs of tuberculosis were present. Four cases reacted after the first injection, four after the second and one after the fourth injection.

In three cases a local reaction took place. In fourteen patients with keratitis parenchymatosa, possibly suffering

from hereditary lues, and presenting evidence of a tuberculous disposition, eight were injected but once, the reaction being uncertain, rather negative.

In one case the patient reacted after 1, 2, 3 and 4 mgr. Another was negative after 1, 2, 3, 5, 5 and 8 mgr. Two reacted positively after one injection, without local reaction.

The value of tuberculin injection in disease of the eye is dependent on the local reaction, because tuberculous infection of other parts of the body gives rise to a general reaction.

In 76 cases of so-called scrophulous ocular disease 85 per cent reacted generally and 40 per cent reacted locally, which seems to confirm the statements of Mias and Leslie Paton, who conclude from tests with the opsonic index that phlyctenular disease may be due to weakened or dead tubercle bacilli.

Schumacher believes that the use of tuberculin therapeutically should be advocated in intraocular processes until something better is discovered. His observations lead him to think that the inflammatory processes are rendered less acute and are perhaps greatly benefited.

F. K.

The Relations of Inflammatory Affections of the Orbit to Disease of the Accessory Nasal Sinuses.

BIRCH-HIRSCHFELD, PROF. A., Leipsic (*Klin. Monatsbl. f. Augenheilk.*, January, 1908), contributes a valuable review of 684 cases of orbital inflammation, of which 409 at least (59.8%) depended upon disease of the accessory sinuses. He believes that the percentage would have been still higher if examination of the sinuses had been made in all cases. Of the 409 cases with sinus disease, 129 (29.8%) showed involvement of the frontal sinus, 89 (21.8%) of the maxillary antrum, 83 (20.5%) of the ethmoidal cells, and 25 (6.1%) of the sphenoidal sinus. In 60 cases (14.7%) several cavities were affected, most frequently (25 times) the frontal and ethmoidal, then the ethmoidal and antrum (12 times) and finally the ethmoidal and sphenoidal (10 times).

In almost all cases the condition was chronic or acute purulent sinusitis, so-called sinus empyema, which had followed rhinitis, influenza, pneumonia, scarlet fever and diphtheria.

or after traumatism. Hydrops of the frontal and ethmoidal cells (mucocele) involves the orbit by bulging forward the orbital wall, and displacing the eyeball, but does not lead to orbital inflammation. Sinus empyema breaks through the orbital wall usually without bulging the walls inward. The orbital extension results from otitis, caries and necrosis of the bony wall, and takes place notably where the periosteum is poorly developed, and where vessels pass through the bone. At times there may be dehiscences in the bone, as Zuckerkandl and others have shown, which render the passage of the inflammation easier. It is, however, not absolutely necessary for a perforation to exist, as thrombophlebitis or periphlebitis of the penetrating veins has been proven to be the cause in several cases. Following perforation, the orbital process may be that of periostitis, orbital abscess or orbital phlegmon. At times the periosteum may limit the extension of the inflammation and a subperiosteal abscess will be found, which may pass forward or backward. In the first case the pus may point at the orbital margin, and be evacuated spontaneously through lid or conjunctiva.

When the orbital tissue is affected there may be an encapsulated abscess, or thrombophlebitis, depending in the first place upon the virulence of the exciting organisms and secondly upon the local conditions. For the spread of the inflammation not only the veins but the lymph spaces play a decided role. Birch-Hirschfeld has been making experimental investigations of the lymph spaces in the orbit, which have never been worked out, and has found that the fatty tissue in the connective tissue septa, together with the blood-vessels, contains a rich system of clefts which he thinks act as lymph spaces. These are connected with the periosteum, surround the penetrating blood vessels and serve as pathways for the leucocytes.

Inflammation of the retrobulbar tissue usually causes pronounced protrusion and immobility of the eyeball, chemosis and edema of the eyelids.

Bacteriology of Sinus and Orbital Inflammations.—According to Grünwald fetid sinus disease is usually of buccal origin; mucopurulent inflammation without bad odor is chiefly due to nasal disease. Malodorous empyemas according to Stanculéanu and Baup are found especially in connection with

dental affections and are produced by anaerobic bacteria (*Bac. racemosus*, *serpens*, *perfringens*, etc.) while the non-fetid cases are caused most frequently by pneumococci, streptococci and influenza bacilli.

Diagnosis.—Kuhnt lays stress upon circumscribed tenderness in the region of the supraorbital fossa as an important diagnostic point in frontal sinusitis, while tenderness of the inner wall of the orbit points toward ethmoidal disease, and that over the frontal process of the superior maxilla to antral empyema. In inflammation of the deeper lying sinuses, perineuritis optica causing pain on movements of the eyeball, and on pressure backward on the ball is an important symptom. The direction of the dislocation of the eye is also of value, if orbital phlegmon is not present, in determining the position of the abscess and the sinus affected. The diagnosis is still easier if a circumscribed fluctuating tumor is present at the orbital margin, or a fistula exists, probing of which will show the point of perforation.

Involvement of the optic nerve is most important, from a diagnostic point of view, as it often indicates inflammation of the sphenoidal sinus or of the posterior ethmoidal cells. Birch-Hirschfeld disagrees with other authors, especially Bryan, as to the frequency of contraction of the visual fields, when the optic nerve is involved. His statistics show contraction in at most only 8 per cent of the cases of empyema of the sphenoid with involvement of the orbit, but he thinks the cases should be more carefully examined in the future, for this condition. The disturbance of *central color perception* he considers more important, and the determination of a central scotoma either relative or absolute, will probably be found more frequently than the cases in literature would indicate. The author has found three cases with red and green scotomas in the past ten years, in which the diagnosis of inflammation of the posterior sinuses was confirmed by operation and he mentions eight others from literature.

Blindness is also produced by empyema of the frontal, ethmoidal and antral sinuses. The highest number in his series of 89 cases of amaurosis was due to inflammation of the antrum (24 cases or 27%); frontal disease caused six cases, and ethmoidal disease thirteen cases. The pus may burrow its way from the ethmoidal perforation to the apex of the orbit,

but many cases are due to thrombophlebitis of the optic veins, especially in antral empyema. *Ophthalmoscopically* hyperemia of the papilla, choked disk and optic atrophy were seen most frequently, and in a few cases thrombophlebitis of the retinal veins, retinal hemorrhage and retinal detachment were observed. In 409 cases there were 18 ulcers of the cornea, 8 times panophthalmitis, and twice glaucoma. Blindness followed in 66 out of 409 cases (16%).

Death occurred in 52 out of the 409 (12.7%), as follows: Sphenoidal empyema of the sinus 28%; of the frontal 16.3%; of the maxillary antrum 14.6%, and of the ethmoidal cells 6%. The mean death rate is less than in orbital inflammation without sinus affection (17% in 275 cases), as treatment of the sinus disease has a good influence upon the orbital inflammation, and thrombophlebitis less often occurs than in so-called genuine orbital inflammation. Postmortem examination showed meningitis 34 times, frontal abscess 15 times, sinus thrombosis 6 times. In four cases the patient died of pneumonia, in two of sepsis.

Treatment.—The author strongly recommends evacuation of the pus through an incision along the orbital margin. After the hemorrhage is completely controlled the periosteum of the orbit is raised, and the pus can be evacuated frequently without opening the *septum orbitale*. The abscess cavity can be cleansed and the perforation found. In this way the author has been able to expose the median wall of the orbit as far back as the posterior ethmoidal cells. In some circumstances, Krönlein's temporary resection of the temporal wall may be of service. For the sinus operations he believes strongly that an expert rhinologist should be called in, and the best results will be secured if the rhinologist and ophthalmologist work together.

E. A. S.

Clinical and Therapeutic Observations Upon Juvenile Glaucoma.

ABADIE (Ref. in *Klin. Monatsbl. f. Augenheilk.*, May-June, 1907, p. 565) recommends in juvenile glaucoma mercurial injections or inunctions. If these are not successful, simple paracenteses may be tried, and if these fail, iridectomy should be performed. As cause of buphthalmos, foci of chorio-

retinitis are found often far out in the periphery and therefore unnoticed.

In the discussion (French Ophth. Society) Motais recommended iridectomy. Antonelli said that to Abadie's cases of buphthalmos could be added the cases of simple myopia, which appeared either congenitally or in the first years of life, and depended on an intra- or extrauterine chorioretinitis. They are often unilateral, or more pronounced on one side than the other in cases of hereditary syphilis. Antonelli believes that the early stretching and thinning of the eyeball under the influence of the dystrophy represents the first stage of a more severe dystrophy or disease which leads later to buphthalmos. Abadie replied that iridectomy was unnecessary in some cases.

E. A. S.

The Frequency of Primary Glaucoma in the Clinic at Pisa.

MAGGI, FRANCESCO (*LaClinica Oculistica*, Palermo, June, 1907, ref. in *Wochenschr. f. Ther. und Hyg. des Auges.*, August 8, 1907). The author compares the statistics of the frequency of glaucoma in Italy with those of other countries, which showed a higher percentage (from 1.39 to 3.46%) than in Germany, France, Portugal and the United States. According to Maggi's statistics, the percentage of cases of primary glaucoma in the clinic at present is not higher than in other countries. It is more frequent in women than in men, usually occurs between 50 and 70 years, and its development is favored by hypermetropia.

E. A. S.

A New Case of Magnet Operation on a Child.

HIRSCHBERG, J. (*Centralbl. f. prakt. Augenheilk.*, February, 1908, Vol. xxxii, p. 33) saw a boy ten years old who was struck on the right eye by a piece of steel, with loss of sight for three days. Examination revealed the piece in the vitreous. The patient was placed before the giant magnet and the foreign body was thereby drawn first nearly through the iris, but finally through the pupil. Then under general anesthesia, paracentesis of the cornea, and insertion of the small magnet, the steel was withdrawn. Healing was normal.

The author also describes a case of primary hemorrhage, following the magnet operation. During the extraction of the

foreign body, there was a prolapse of the iris, which had to be excised. Two days later, there was a hemorrhage with glaucomatous symptoms and the eye was enucleated on account of fear of sympathetic ophthalmia.

A case of secondary hemorrhage was reported in the *Centralblatt*, April, 1907, by the author.

The author reports a case of tertiary hemorrhage. The patient had carried the piece of steel in his eye for nearly sixteen years. The presence of the foreign body was shown by the sideroscope and the radiograph. The piece of steel was drawn into the anterior chamber, but it was so large that its passage caused an iridodialysis, and it stuck in the iris, and could be removed only by means of an iridectomy. The next day there was a slight secondary hemorrhage, which was soon absorbed.

Fourteen months later he was struck on the same eye by a man's head, with loss of sight in a few hours, due to intra-ocular hemorrhage. This gradually cleared up however, with return of sight to about that after the magnet operation.

C. L.

Trauma of the Cornea Caused by Lightning.

WICHERKIEWICZ (*Postęp okulistyczny*, Nos. 6 and 7, 1906, Abst. in *Wochensch. f. Ther. u. Hyg. d. Auges.*, February 6, 1908, Vol. xi, p. 146) reports a case of this very rare condition. A pastor was preaching in a church that was struck by lightning. Several people were killed, and the pastor himself was rendered unconscious. On regaining consciousness, his limbs were weak, his lids and lips felt heavy; there was deviation of the tongue, disturbance of speech, swelling and redness of the face. These disappeared in a few hours, leaving an inflammation of both eyes, especially of the right.

When seen the patient had edema of the right lid, injection of the conjunctiva and isolated places of loss of corneal epithelium. A similar condition was present in the left eye. The treatment resulted in complete cure.

The author considers the lesion to be due to the ultra-violet rays.

C. L.

Ophthalmoreaction.

BARBIER (*Klin. therap. Wochensch.*, 1908, 2. Abst. in *Wochensch. f. Ther. u. Hyg. d. Auges.*, February 6, 1908,

Vol. xi, p. 147) tested a child who had had a keratitis several years before. A severe keratitis was caused, which lasted two months and was accompanied by ulcer formation and almost complete loss of sight in one eye.

Another case that was diagnosed as tuberculosis of the lungs on account of the positive reaction, was found to be a pleuritis caused by an echinococcus of the liver.

Renon found the reaction positive in fifteen out of eighteen cases, three of which showed a very severe conjunctivitis, keratitis or iritis.

Morax found no bad effects on either normal or diseased eyes.

Comby tested more than 300 children and found the reaction a simple and trustworthy one.

Aesn  found that a 2 per cent solution was better than a $\frac{1}{2}$ per cent solution as the former caused no bad effects and the latter did.

Souques found no parallelism between the subcutaneous and the ophthalmic reactions in one-half of the cases, which speaks against the diagnostic value of the tuberculin.

deMassary found in 42 of 70 cases an agreement between the reaction and the clinical findings. In a case of general carcinomatosis, a positive reaction was obtained three times, though tuberculosis was positively excluded.

M ry considers that the reaction has a relative value as the majority of times it agrees with the clinical findings. C. L.

The Pathogenesis of Anterior Synechia.

SOMMERS, G. (*Wochensch. f. Ther. u. Hyg. d. Auges*, February 13, 1908, Vol. xi, p. 153) reports a case of leucoma corneae adherens where there had been no perforation of the cornea or prolapse of the iris. The patient had been struck on the right eye four days before and had suffered apparently a simple erosion of the cornea. Owing to the pain, etc., he applied to Sommers for treatment. He found a severe inflammation of the right eye, a large flat ulcer of the cornea, secondary iritis and hypopyon. The ulcer was cauterized and antiphlogistic treatment instituted. A portion of the hypopyon was absorbed, but the remainder became organized, and shrunk, drawing the iris forward and the cornea backward. The case is still under observation. C. L.

Spermin.

POEHL (*Russ. Journ. f. med. Chemic und Organotherapie*, Abst. in *Wochensch. f. Ther. u. Hyg. d. Auges*, February 20, 1908, Vol. xi, p. 163) states that Kazauoff saw improvement in vision in two cases of optic nerve atrophy by the use of spermin. In one case there was no improvement. In Bellarm-inow's clinic, in every case where there was a remnant of vision, this was somewhat improved, and the field of vision was enlarged. Two cases of *amblyopia alcoholica* were cured by use of spermin. C. L.

Trauma of the Eye Caused by Lightning.

HILBERT, R. (*Wochensch. f. Ther. u. Hyg. d. Auges*, February 27, 1908, Vol. xi, p. 169), saw two cases in the summer of 1907. Both were telephone operators who were struck while seated at their instruments.

I. Examination.—Both pupils widely dilated, very slow reaction, cornea cloudy, bulbi hard as rocks, ciliary injection. Patient complained of pain and of seeing rainbows around the light. It was a case of acute glaucoma. Under treatment with eserine, this receded and in about three weeks he was able to attend to his work.

II. Examination.—Complains of dazzling sensations and tearing. Nothing found but a conjunctival catarrh. Treated with boric acid lotions, dark room, and potassium bromide.

The author further mentions cases of other ocular conditions reported by different authors. The most frequent is cataract; glaucoma has never been reported before. C. L.

Critical Observations and Experiments to Test the Value of the Ophthamoreaction.

KRAUSE AND HERTEL (*Mediz. Klinik*, 1908, No. 4, Abst. in *Wochen. f. Ther. u. Hyg. d. Auges*, February 27, 1908, Vol. xi, p. 171) tested more than 100 patients with the ophthamoreaction. They found that there were some unpleasant features connected with the test. Furthermore there is need for more unanimity in regard to the method of testing and the kind and strength of the reagent. Ocular diseases sometimes influence the result, as for example phlyctenulae. C. L.

The Etiology of Acute Conjunctivitis.

SOMMERS, G. (*Wochensch. f. Ther. u. Hyg. d. Auges*, February 27, 1908, Vol. xi, p. 173). While spreading some Thomasschlacke* upon his lawn, the wind blew some into his eyes, which he immediately washed out with cold running water. The burning sensation was at first slight but increased in the next few hours. The principal symptoms were tearing, formation of a thin mucous secretion, photophobia, and sensation of foreign body in the eye. By evening he had recovered sufficiently to visit a patient. The fertilizer consists of 17.5 per cent phosphoric acid, 50 per cent lime, of which 12 per cent is free and 7.5 per cent in the form of silicic acid; also, a trace of sulphur and sulphuric acid. It is very readily soluble in water, consequently in the tears. It is questionable which of the ingredients does the damage. People working with artificial fertilizers should wear protective glasses.

C. L.

*An artificial fertilizer.

Blenorrhoea Neonatorum.

GREEFF, Berlin (*Die Therapie d. Gegenwart*, January, 1908, Abst. in *Wochensch. f. Ther. u. Hyg. d. Auges*, March 5, 1908, Vol. xi, p. 182), claims "Every case of conjunctivitis gonorrhoeica, at least that of the new-born, is curable." For prophylaxis he advises a $\frac{1}{4}$ per cent silver nitrate solution. In the treatment, at the Charité, they for a long time have used only a 0.1 per cent of silver nitrate for washing out the eyes, which must be done very frequently. This has given much better results than the stronger solutions. The eye can be saved if lavage is made every couple of hours, day and night, during the first critical days. Greeff claims that the weaker solutions penetrate into the tissues better than the stronger ones.

C. L.

The Instillation of Tuberculin into the Eye.

FISCHER, ERNST, Dortmund (*Centralbl. f. prakt. Augenheilk.*, March, 1908, Vol. xxxii, p. 65) reviews the history of ophthamoreaction, and claims for Wolff-Eisner of Berlin, priority in this reaction over Calmette. The test has been

found to be a fairly reliable one, but is not without danger to the eye. The author reports the following case: On November 6, 1907, a colleague made the test on the right eye of a man who three years before had coughed up half a tablespoon of clear red blood. One year later there was a slight affection of the right apex; otherwise patient was and had been in the best of health. The reaction in the eye had not subsided by November 29. There were phlyctenulae, and considerable redness of the conjunctiva of the nasal side. The phlyctenulae healed, but on December 24th a new one appeared. They always appeared on the reddened area. January 11, 1908, an ulcer appeared on the corneo-scleral margin, extending centrally over the cornea. Circumcorneal injection and iritic irritation. February 9, ulcer healed, but irritation still present. This and similar cases should make the oculist careful about using the reaction.

C. L.

Allergie-Diagnosis.

V. PIRQUET, Vienna (*Therap. Monatshefte*, November, 1907, Abst. in *Wochensch. f. Ther. u. Hyg. d. Auges*, December 12, 1907, Vol. xi, p. 81) means by this term those characteristic phenomena exhibited by an organism which has passed through a certain disease when it is infected with the specific cause of the disease. The tests are made on the living organism by means of the extract of the dead germs, and may be made in several ways. First by subcutaneous injection, which produced fever and other unpleasant symptoms. Second, by cutaneous inunction, which the author copied from vaccination. It is easily controlled, there are no untoward symptoms, and it may be frequently repeated. Recently there has been added a third method, called the ophthalmo-reaction, which consists in instillations into the conjunctival sac. Pirquet advises against the latter, as the symptoms are unpleasant.

C. L.

The Obligatory Credezizing of the Newborn.

HELLENDALL, HUGO, Düsseldorf (*Med. Klinik*, Nos. 47 and 48, 1907, Abst. in *Wochensch. f. Ther. u. Hyg. d. Auges*, December 12, 1907, Vol. xi, p. 84), advocates the use of Cr  d  's solution for all newborn children. He calls attention

to the fact that there are latent cases of gonorrhea in both men and women, where the gonococcus cannot be demonstrated but which are capable of evoking ophthalmia neonatorum. Furthermore, the solution protects the eyes against a large number of other infectious germs which might cause hemorrhage. Inasmuch as it may become concentrated or decomposed, and injure the cornea, the author advocates instead of the usual method the use of ampullae of 1 per cent solution of silver nitrate, each containing 0.5 cc. This is broken and the fluid poured into a pipette containing cotton free from oil. This filters out any pieces of glass or impurities, and allows only one drop at a time to fall into the conjunctival sac, each drop taking from 10 to 30 seconds to form. Each case requires a separate ampulla. These as well as the pipettes can be obtained from the Düsseldorfer Flora-Apotheke in cartons of ten, price about 40 cents.

C. L.

An Optical Deception.

v. REUSS, A., Vienna (*Verhand. der Morphologisch-Physiologischen Gesellschaft zu Wien*, 1906-1907, May 7, 1907), makes the following report: If we look at two balls suspended by threads which are rotating rapidly around a vertical axis at some meters away, after some time an apparent reversal of the direction of rotation will take place. v. Reuss used gas-self-lighters, whose tips were placed in two aluminum bells. They hung from a flying wheel of mica and were set in centrifugal motion by hot air. The reversal and re-reversal did not take place, as first appeared according to the will of the observer, but involuntarily and according to fixed law. If one looks to the side, above or below the direction of rotation, the reversal occurs without the will of the observer, that is, when the retinal image was excentric. It happens when there is any alteration in the convergence of the visual axis, or when a convex or concave glass is held in front of the eye, that is, whenever the retinal image is indistinct. Reuss considers the deception to be the same as that observed in the case of a windmill seen in the twilight. It is a case of deception in space-perception.

C. L.

Investigation of the Absorption of Chemically Active Rays by Means of Spectacle Lenses.

HALLAUER, O. (*Wochensch. f. Ther. und Hyg. d. Auges*, December 19, 1907, Vol. xi, p. 95) covered Velox paper by different shades of colored glasses and found that the ordinary blue and smoked glasses were insufficient to protect against strong lights. He recommends glasses colored greyish green, which fully protect.

C. L.

Etiology and Therapy of Iritis.

CLAUSEN, W. (*Charité-Annalen*, Vol. xxxi, Abst. in *Wochensch. f. Ther. u. Hyg. d. Auges*, December 19, 1907, Vol. xi, p. 91). The cause should first be determined and removed in order to cure the attack and prevent recurrences. Locally, antiphlogistic measures should be used, such as blood-letting. Then atropin in $\frac{1}{8}$ per cent to 1 per cent watery solution. Cold applications are not well borne, but warm moist applications, frequently repeated, are very grateful. Mercury and the iodides to be used wherever lues is suspected. Sajodin is a new iodide preparation which is said to have the same value as the iodides without their unpleasant features. The bowels should be thoroughly cleansed, and diaphoresis should be used by subcutaneous injections of pilocarpin. In hospitals, the electric-light baths may be used to obtain a very profuse sweat. Alcohol and tobacco should be forbidden. The rest cure is very good in the beginning, allowing the patient out of bed only 2 to 3 hours a day.

C. L.

Psychic Paralysis of Vision, Optic Ataxia, Disturbance of Space Perception.

BALINT, RUDOLF (Abst. in *Woch. f. Ther. u. Hyg. d. Auges*, December 19, 1907, Vol. xi, p. 92), first observed this symptom complex in a patient of the medical clinic.

1. The patient observes only one object to the total exclusion of all others. This one he sees only superficially, not recognizing the details. If forced to direct his attention thereto, he considers other objects as parts of the one at which he is looking.

2. The attention of the patient is constantly directed towards the right, up to 35° to 40°.

3. The function of the right hand of the patient is affected so that all movements requiring the guidance of vision are in-co-ordinated, becoming normal as soon as the touch or muscle sense aid.

The author demonstrated a specimen of the brain, which showed symmetrical softened areas in the inferior parietal lobe and the centrum semiovale, and discussed the relation of this lesion to the disease.
C. L.

Experiments With Sajodin.

GEBB, H. (*Med. Klinik*, No. 41, 1907, Abst. in *Wochensch. f. Ther. u. Hyg. d. Auges*, December 17, 1907, Vol. xi, p. 92), tried Sajodin on fifty-two patients, in the form of 15-grain powders or 7½-grain tablets, 45 to 60 grains a day. There were never any untoward symptoms, even in long continued use. It was used in three cases of ablatio retinae for its absorptive action. In hemorrhages into the vitreous, following trauma, it cleared up the opacities very well.
C. L.

Ocular Findings in Insane People.

BONDI, M., Iglau (*Wiener med. Presse*, No. 41, 1907, Abst. in *Wochensch. f. Ther. u. Hyg. d. Auges*, December 26, 1907, p. 98), examined the eyes of 206 patients with various mental diseases and comes to the following conclusions:

1. In some forms of psychoses, especially epileptic and hysteric madness, melancholia, mania, amentia, the ophthalmoscopic examination in general was negative.

2. In others, such as alcoholism, progressive paralysis, i. e., insane where the etiology explained the findings, the latter were certainly much more pronounced than in other insane patients.

3. The medullated nerve fibers were certainly more numerous in insane people, which was also true of the half-albinotic fundi and cataracta punctata cerulea.

4. No relationship could be found between light degrees of errors of refraction and insanity.
C. L.

The Bacteria of Conjunctivitis.

SCHOLTZ, KORNEL, AND VERMES, LUDWIG (*Orvosi Hetilap*, No. 25, 1907, Abst. in *Wochensch. f. Ther. u. Hyg. d. Auges*, December 26, 1907, Vol. xi, p. 103), examined 500 cases of conjunctivitis taken at random from 5,611 patients. They found the Morax-Axenfeld diplobacillus the cause of 7.9 per cent acute, 46.3 per cent sub-acute, and 63.5 per cent chronic conjunctivitis. The Koch-Week's bacillus was the cause of 42.4 per cent acute, 14.6 per cent sub-acute, and 1.7 per cent chronic conjunctivitis. The pneumococcus was the cause in 6.4 per cent acute, 2.4 per cent sub-acute, 4.3 per cent chronic conjunctivitis; the streptococcus in 2.1 per cent acute, 1.2 per cent sub-acute, 1.1 chronic, and the gonococcus in 6.4 per cent of acute conjunctivitis. The diplobacillus (Friedländer-Morax) caused 0.3 per cent chronic conjunctivitis, the staphylococcus 15.1 per cent acute, 10.9 per cent sub-acute, 13.5 per cent chronic cases, the xerosis bacillus was present in pure culture in 7.2 per cent acute, 12.2 per cent sub-acute, 8.9 per cent chronic cases. Negative findings in 12.2 per cent acute, 12.2 per cent sub-acute and 6.4 per cent chronic cases.

C. L.

The Relationship Between Hemeralopia and Keratomalacia.

SCHIELE, A. (*Wochensch. f. Ther. u. Hyg. d. Auges*, December 26, 1907, Vol. xi, p. 101), finds that in February, March and April, the months in which the great fasts fall, the number of cases of hemeralopia reaches the maximum, and at the same time, is almost the only period when keratomalacia is found in children. Hemeralopia and keratomalacia (xerosis conjunctivae) are symptoms of a general condition dependent on malnutrition, especially lack of fat. This acts through the liver and causes an abnormal condition of the blood. That it is a liver condition is proven by the rapid recovery under cod-liver oil. He reports the case of a mother with hemeralopia and her suckling child with xerosis conjunctivae and beginning keratomalacia. The mother was given cod-liver oil and the child got well with a slight macula corneae.

In cases of keratomalacia, he also uses, locally, iodoform and gallacin, iodogallicin, a salve of 5 per cent eserine and iodo-

gallicin, and touching the ulcer with iodine in a nascent state (KI + HI O₈). C. L.

Investigation as to the Presence of Bacterial Substances in the Conjunctival Fluid, with Remarks on the Healing Process in Conjunctival Catarrh.

NEDDEN, ZUR, Bonn (Abst. in *Wochensch. f. Ther. u. Hyg. d. Auges*, January 2, 1908, Vol. xi, p. 105), testing the bactericidal properties of the tears with dysentery and typhoid bacilli, as well as diplobacilli grown on agar free from serum, showed that the first two were enormously increased, while the last was not diminished. The active serum of the corresponding person possessed for all three a high bactericidal power. In catarrhal conditions, however, there was in all cases bactericidal properties present in the secretion, proportional to the amount of secretion. The bactericidal substances come from the blood by passing through the tissues.

The intensity of the infection rather than the kind governed the quantity of these substances. Both the fluid and formed parts of the secretion were bactericidal, but less so than the blood, since they were diluted by the tears.

The proper substances for use in conjunctivitis are those which promote hyperemia. Stasis and suction therapy are not to be used on the eye. Astringents have long been used. The diplobacilli are entirely killed by silver nitrate and the oxycyanate of mercury, but are barely affected by zinc sulphate. The latter should not be used in pneumococcal ulcers, on account of their malignancy. C. L.

Removal of a Piece of Iron Which Had Penetrated the Eye via the Orbit.

CRAMER, COTTBUS (*Monatsch. f. Unfallheilk. u. Invalidenwesen*, No. 11, 1907, Abst. in *Wochensch. f. Ther. u. Hyg. d. Auges*, January 2, 1908, Vol. xi, p. 106), publishes this case on account of its rarity. The foreign body entered from the region of the lacrimal sac through the orbital tissues into the eyeball, where, after piercing the wall, it stuck in the sclera. It was necessary to enlarge the orbital wound and to make several efforts before it could be caught by the magnet. It was then carefully grasped by a non-magnetic forceps and

withdrawn. It was an acute-angled, jagged piece of iron, 18 mm. long and 8 mm. at its greatest width. C. L.

A Case of Edema Malignum of the Eyelids.

SALUS (*Prag. med. Wochensch.*, No. 46, 1907, Abst. in *Wochensch. f. Ther. u. Hyg. d. Auges*, January 2, 1908, Vol. xi, p. 106), reports the case of a patient 52 years of age, whose upper lid and vicinity began to swell without external cause, with the formation of a small nodule underneath, which continued to grow. Bluish vesicles appeared on the skin of the lid, which easily ruptured, yielding a yellowish fluid. When the very feverish patient was admitted, the left upper lid was greatly swollen and densely infiltrated, as was, to a less degree, the lower lid, so that the palpebral orifice could not be opened. The skin of the upper lid was covered with numerous reddish brown vesicles, about the size of a small hazel nut, full of sero-sanguinous fluid, the remainder of the lid in places covered with brownish discolorations, or superficial ulcers. The swelling extended from the brow above down over the cheek and over the nose to the lids of the right eye. The preauricular and submaxillary lymph nodes were swollen and sensitive.

The bacteriologic examination showed large numbers of anthrax bacilli and streptococci. Nothing found in the blood. The local condition improved under antiseptic treatment, while the general condition always was good. The ulcers healed by granulation. At the time the patient left the hospital there was still a slight defect at the inner canthus. There was lagophthalmus of about 2 mm. and a slight elevation of the lids from the ball. C. L.

A Case of Non-Traumatic Conjunctival Hemorrhage.

KOHAN, JAFFA (*Klin. therap. Wochensch.*, 1907, No. 50, Abst. in *Wochensch. f. Ther. u. Hyg. d. Auges*, January 9, 1908, Vol. xi, p. 113), treated an eight-months' healthy boy whose eyes had been bleeding for three days. A large clot filled the conjunctival sac. An infiltration was found in the middle of the somewhat cloudy cornea. The conjunctiva of the everted lids was smooth, slightly hyperemic, and the fold

of transition was loose, especially outwards. Here the blood seemed to ooze out like pearls of sweat. The other eye showed similar finding.

The treatment consisted in atropin and cocaine, 2 per cent silver nitrate to fold of transition, lavage with a cold weak sublimate solution, compression bandage, and at night cold applications of a weak solution of potassium permanganate. Finally it was necessary to use three drops of a 1/5000 adrenalin solution, whereupon the hemorrhage ceased. C. L.

The Examination of Reflex Vestibular and Reflex Optical Movements and Their Significance Relative to the Topical Diagnosis of Ocular Muscle Palsies.

BARAXY (*Muensch. medic. Wochenschr.*, June 4, 1907, No. 23). He concludes:

1. The slow movement of vestibular nystagmus emanates from the primary ocular muscle nuclei.

2. The association of the *slow* vestibular movements is brought about by respective division of the vestibular paths ascending from Deiter's nucleus.

3. The *rapid* movement of vestibular nystagmus arises from visual centers, the localization of which is still hypothetical.

4. Disturbance of the primary nuclear region or peripheral nerves abolishes every form of ocular motility in the muscles affected. Voluntary, reflex, optical, and vestibular movements, however, outside the affected region, remain undisturbed.

5. A double-sided lesion of the vestibular fibers situated before their termination in the primary nuclei, completely destroys vestibular movements. The optical reflex and voluntary eye movements, are left intact (deaf mutism following meningitis).

6. A double-sided interruption in the fibers between the visual center and primary ocular muscle nuclei or a lesion in the visual center itself, leaves undisturbed the slow vestibular movement, likewise the continuous innervation of the eye muscles by strong vestibular stimulation; the reflex optical and voluntary stimulation causes involuntary turning of the eyes with maximum lateral rotation.

7. A double-sided lesion of the voluntary bundles above the visual center destroys voluntary ocular movements, leaves un-

affected the vestibular nystagmus and in the conscious state with preservation of the faculties of concentration probably also optical nystagmus.

8. A one-sided lesion of the parts connecting the visual center with the primary ocular muscle nuclei induces conjugate paralysis of voluntary motion toward the side of the lesion, at times with deviation of the eyes toward the sound side.

If a vestibular stimulus is produced to effect normal nystagmus towards the affected side deviation of the eyes towards the sound side occurs, but in the direction of the opposite side there occurs only very slight or no nystagmus.

If, on the other hand, vestibular stimulation is produced to effect nystagmus towards the sound side, the eyes during the action of the stimulus can voluntarily turn towards the opposite side with maximum lateral rotation, or involuntarily, they are rotated on exclusion of voluntary movements towards the diseased side at times with maximum lateral rotation.

The author submits several case histories which in part substantiate these deductions.

A. C. S.

The Relation of the Medulla Oblongata to the Pupil.

BACH, L., Marburg (*Münch med. Wochenschr.*, June 18, 1907). Bach and Meyer observed in cats sustained by means of artificial respiration that section near the spinal extremity of the fourth ventricle oftentimes resulted in immediate loss of the light reflex with medium sized pupils, while sections several mm. above or below this region never produced the same result.

The negative results of Bumke and Trendelenburg experimenting along similar lines, they ascribe to destruction or functional exclusion of the light reflex center or to the fact that the center was infringed upon.

Bach and Meyer believe the center to be very sensitive and not suited to protracted experimentation. Moreover, they claim they are in a position to completely disregard the results obtained after section of the medulla according to the above methods without relinquishing their hypothesis based chiefly on the following observations:

Exposure of the fourth ventricle from the occiput often caused decided miosis with absence or marked diminution of the light reflex action. Less frequently and less apparent were

such pupillary disturbances after exposing the fourth ventricle from the cervical cord.

Restoration of the light reaction was never observed, even after a lapse of $\frac{3}{4}$ of an hour—not until a section was made cerebrally from the middle of the ventricle—when light reaction immediately recurred, the response being both prompt and complete. The authors regard this positive result as the main support of their hypothesis. A. C. S.

Concerning the Cure of Iritis, Iridocyclitis, Blenorrhea Neonatorum.

FUKALA, V., Vienna (*Münch. med. Wochenschr.*, October 7, 1907).

Iritis, Iridocyclitis.

1. The pupil must be dilated ad maximum.
2. A specific remedy must be employed.

Mydriasis is effected by instillations of atropine (1, 2, 3 and 4%) repeated just often enough to keep the pupil dilated. Should there exist a firm attachment of the pupillary margin to the capsule, atropine is to be discontinued.

The specific remedy is a solution of bichloride of mercury 1/4000. A pledget of absorbent cotton in the grasp of a specially constructed forceps is dipped into the warmed sublimate solution (36° C.) and the solution is thus applied to the pericorneal conjunctiva after the eye has been thoroughly cocaineized.

Atropin is then instilled—this procedure is repeated daily.

Potassium iodide is not administered except in syphilitic cases.

In iridocyclitis the response to treatment is more gradual. Cocain and atropin must generally be used in stronger concentrations. Bichloride of mercury is also administered by the mouth.

In cases seen early a cure is certain.

In severe forms of iritis with pupillary occlusion, in painful cyclitis, in iritis punctata splendid results have followed this treatment, although, of course, vision usually suffered. After the subsidence of acute symptoms, iridectomy is frequently necessary. The author cites several case histories.

In ophthalmia neonatorum he considers 2 per cent. solutions of silver nitrate useful in mild cases but 4 and 5 per cent solu-

tions absolutely certain curative remedies. He is accustomed to use a 5 per cent and has never encountered any corneal complications. He prefers to apply the silver nitrate with forceps and cotton.

On gonorrheal ophthalmia a cure is possible only in the very early stages. Four per cent silver nitrate should be applied to the cocainized lids morning and night. Two to three minutes after the application the conjunctival sac is flushed out with water.

He thinks the attention of the general public should be called to the favorable prognosis following early treatment by this method.

The curing of iritis, iridocyclitis, and ophthalmia neonatorum means a decrease of 20 per cent in the number of blind.

A. C. S.

Concerning the Value and Theory of Subconjunctival Injections.

BATTABAN, Lemberg (*Wiener klin. Woch.*, December 19, 1907, No. 51). His preliminary remarks are devoted to a brief historical review of this method of treatment. While various medicaments have at one time or other been used in such injections, most ophthalmologists of the present day rely solely on salt injections. Darier still holds enthusiastically to sublimate injections. Experimental and clinical experience both prove, however, that the efficiency of such injections is not to be attributed to the mercury salt. According to Bach only an infinitesimal amount really penetrates the eyeball.

The results of Wessely's investigations relative to the fate of the subconjunctival injection, its effect on the eye and in particular, the ocular fluids are gone over in full by the author. Wessely's conclusions in brief are, that hyper- and hypotonic salt solutions after variable periods of time are converted into blood isotonic solutions. The sodium chloride enters the blood vessels by diffusion and osmosis, the lymph vessels not participating in the absorption of crystalloid substances. Highly concentrated salt solutions are absorbed more slowly not so much because of the resulting volume increase of the injected fluid but because of the irritated condition of the conjunctival vessels. The rapidity of the fluid currents in the anterior chamber is uninfluenced, the albuminous constituents of

the aqueous, however, are increased proportionately to the concentration of the solution, a condition induced by reflex irritation of the vessels and nerves of the ciliary body. Finally, such injections cause a marked increase of protective bodies (amboceptors, alexins, etc.) in the aqueous humor.

Inasmuch as reactive processes in inflammatory states have been considered protective measures on the part of the organism, analogous reactions consecutive to subconjunctival injections must be regarded as appropriate and curative measures in certain ocular affections.

Battabon believes that these injections facilitate the entrance into the eye of drugs administered by the usual methods.

In acute inflammations he considers the treatment futile and possibly harmful but indicated in such chronic processes as iridocyclitis, retino-chorioiditis, vitreous opacities and hemorrhages, retinal detachments dependent on chorioiditis. In large subconjunctival hemorrhages the injection of salt solutions very favorably influence absorption.

He favors making a series of injections (20-25) in close succession, these to be followed after a period of rest lasting one to two weeks by a second series if necessary. A. C. S.

Concerning the Iodine Inunction Treatment.

ZIMMERMANN, Görlitz (*Die ophth. Klinik*, November 20, 1907, No. 22). The writer has used iothion by inunction over a period of two years. He regards it equally as efficacious as the interval administration of K.I., seldom causing iodism and being greatly preferred by patients.

Iothion is an ester of hydriodic acid, soluble with difficulty in water but readily soluble in oils and alcoholic solutions. It contains about 80 per cent iodine which remains combined with the oil or ointment base, no soiling of underwear thus occurring. The best vehicle is American vaseline or equal parts of the latter and lanolin.

Inunctions in adults are made with 25 per cent, in children with 10 to 25 per cent ointments.

He has found it very useful not only in general scrofulous conditions but almost a specific in scrofulous conjunctivitis and keratitis, and parenchymatous keratitis without other signs of syphilis.

Treatment should be persisted in even after the disappearance of local symptoms.

In adults it has been found of service in cases of vitreous hemorrhages, cortical remains, chorioiditis, recurring iritis and in optic atrophy when K.I. is no longer tolerated.

A. C. S.

A Case of Retrobulbar Neuritis, A Sequel of Iodoform Intoxication.

SARAOFF, Vienna (*Wiener klin. Woch.*, November 28, 1907, No. 48). Saraffoff reports a case in which the injection of a 10 per cent emulsion of iodoform glycerine into a psoas abscess led to serious visual impairment. Altogether 300 grams of the emulsion were injected. Misty vision was first noticed 25 days after the first, four days after the second injection. Vision in each eye then rapidly became worse, the patient being unable to read even the largest print. There were no fundus changes.

Improvement set in at the end of three weeks and, at the end of five weeks vision had returned to its original standard.

Two similar cases have been reported by deVries and Moor.

Palermo subjected rabbits and dogs to toxic doses of iodoform. Microscopical examination of the optic nerves of these animals revealed a proliferation of the nuclei of the connective tissue, especially in the septa, without changes in the nerve fibers themselves.

While in some instances only the papillo-macular bundle is affected by the interstitial inflammation, in others the inflammation may reach the nerve head becoming visible as an intra-ocular neuritis, which may cause permanent visual impairment.

Iodoform, however, primarily affecting the interstitial connective tissue is less dangerous than other medicaments (Felix mas) which directly attack the nerve fibers.

A. C. S.

SOCIETY PROCEEDINGS.

COLORADO OPHTHALMOLOGICAL SOCIETY.

Meeting of April 18th, 1908, in Denver. Dr. Melville Black, presiding.

Pemphigus.

Dr. W. C. Bane re-exhibited the case of pemphigus shown by him at the January and February meetings. He had recently excised the infiltrated tissue, which nearly obliterated the lower conjunctival sac, and brought a flap of conjunctiva from above and lined the sac with it. The tissue removed was examined pathologically by Dr. J. C. Todd, who reported it to be cicatricial granulation tissue, with no evidence of epithelioma.

Discussion.—Dr. Neeper would use x-rays, or preferably the high frequency current, and would note whether the pemphigus affected the transplanted conjunctiva.

Dr. Black would try thiosinnamin, internally, on account of its action on cicatricial tissue.

Dr. Sisson stated that thiosinnamin, by absorbing fibrous tissue, was deleterious in fibroid tuberculosis. He called attention to reported changes in the retina and other ocular tissues from use of the x-rays.

Dr. Jackson related a case in which x-ray had been used up to three times a week for six years, associated with several incisions, for carcinoma near the inner canthus; with no damage to sight. Lately the cancer had invaded the orbit, displacing the eye, injuring the optic nerve, and reducing vision. He thought the x-rays did not usually injure the eye.

Double Monocular Diplopia.

Dr. E. W. Stevens presented a man, aged 60 years. R. V. 4/12, the same line being seen less distinctly above and a little to the left. L. V. 4/12, another line being seen as with the right eye, but below and to the right. With both eyes two lines of letters of equal distinctness, one exactly above the other, were seen.

The patient had first noticed this disturbance of vision two years before. The ophthalmoscope showed nuclear haze of each lens, but no fundus lesions.

Dr. Stevens ascribed the diplopia to the beginning lens opacity. Dr. Friedmann had seen one case of monocular diplopia, associated with an iritic adhesion above, and another synchia below.

Drs. Coover and Libby called attention to cortical opacities in the temporal periphery of each lens.

Dr. Jackson mentioned Freytag's report of 36 cases of double focus lenses. He spoke of the increase of refraction in the clear lens preliminary to the development of cataract; and also recalled C. Hess' cases of this kind in which the lenses did not become opaque for some years.

Chronic Uveitis.

A male, aged 30 years, under observation for the previous two weeks, was also shown by Dr. Stevens. Sight began to fail three years before. The pupils had been kept dilated with atropin for over two years. He had received little constitutional treatment. Vision 4/30 in each eye.

The eyes were now quiet. There was no pericorneal zone of redness. There were several tags of iritic adhesion, and the vitreous was very hazy. He was being treated by mercurial inunctions and potassium iodide, with pilocarpin sweatings.

High Myopia, Detachment of the Retina and Extensive Chorioiditis in the Left Eye, the Right Eye Having No Light Perception.

Dr. Stevens also presented a male, aged 34 years, who had come under observation one month previous.

Fifteen years before he had first put on glasses for poor distant vision. For the past two years he had worn—9. sph. in each eye.

Five years before he had first noticed that the right was blind; having noticed no pain or inflammation. About two months before he had first noticed a large floating body in his seeing eye, which now blotted out the lower temporal field. The right pupil was occupied by opaque lens, and

there was no light perception. The left vision, with — 20. D. S. = 4/20.

Ophthalmoscopic examination showed extensive chorioiditis in the left eye, with detachment of the retina to the nasal side of the disk.

Discussion.—Dr. Chase would give pilocarpin sweats for the retinal detachment. Dr. Sedwick suggested the use of a pin-hole disk to improve central vision.

Infantile Cataract.

This baby was seen by Dr. Melville Black when she was seven months old, in February, 1907. The mother was sure that vision had been good until two months previous. No congenital cataract in the family history.

The child was well nourished, with fully developed eyes. Both lenses opaque; pupils 2 mm. wide, and reacted normally to light.

Under atropin pupils only 4 mm. wide. A needling was performed on each lens, but it was found very difficult to penetrate the capsules, as they were tough and receded before the knife-needle. It was observed when endeavoring to get the knife through the capsule, that the central area was very opaque and that the lens, as pushed by the needle, exposed a peripheral area which was less opaque.

No reaction whatever followed the operation, nor did it cause any apparent absorption of the cataract. Two months later, no apparent change in the eyes was manifest, although another needling had been attempted meanwhile. Dr. Black then opened the cornea at its upper margin with a keratome and performed a small iridectomy. While attempting to grasp the opaque capsule with forceps, vitreous presented.

He went on and removed the opaque capsule. No lens matter was present. No special reaction followed. The child was not seen for five months, when the eye was seen to have a very small pupil at the upper corneal margin, the iris being drawn as a curtain towards it. The iritic curtain was now split by passing a No. 2 Knapp's knife-needle through the lower sclero-corneal junction up to the pupil and cutting downward. When shown before the society six months after this operation, the child had a good central

pupillary area which was free from all membrane. It was also plainly evident that the baby had vision. The question with Dr. Black was, should he do anything more to the other eye, which presented a similar dense membrane, the extraction of which would doubtless be attended with loss of vitreous.

He thought there would undoubtedly be amblyopia from non-use, and that divergent squint would develop, if the membrane was not soon removed; which possibilities could be avoided by its removal. In his opinion it was best to either operate now under general anesthesia or else wait until the child was old enough to have it done under local anesthesia.

Discussion.—Dr. Chase would not fear amblyopia before five years, when he would operate under local anesthesia. He had operated on a boy of five years seven times under local anesthesia.

Drs. Hilliard and Neeper would operate now; the former believing that amblyopia would develop in a few years in the unoperated eye.

Dr. Jackson would not fear amblyopia, but would operate soon, so as not to lose the opportunity of developing the fusion sense.

Ulcerative Keratitis from Foreign Body.

Dr. Black saw this man on March 31, after he had suffered three weeks with a corneal ulcer, occasioned by a neglected foreign body.

Almost the entire left cornea was in a state of ulceration, and was destroyed down to Descemet's membrane. The extensive ulcer was forcibly syringed until clean, with 1-5000 bichloride, and 20 minims of 1-5000 cyanide of mercury was given subconjunctivally. The patient was given a solution containing 25 % argyrol and 1/2% atropin to drop in the eye every two hours. The ulcerative process was arrested at once.

Two injections subconjunctivally of the cyanide of mercury were given later, and the argyrol and atropin were continued. Repair and clearing of the cornea had begun and relief of pain resulted after three days' use of dionin.

The ulcer was now almost healed, and it was evident that some useful cornea would result, without staphyloma.

Discussion.—Dr. Strader believed nitric acid applied to corneal ulcer was more effective than subconjunctival injection of cyanide of mercury.

Dendritic Keratitis.

Dr. Black first saw this man a week before. He gave a history of acute catarrhal conjunctivitis of five days' standing, which process was unattended by pain or photophobia until the day before examination.

Dr. Black found much lachrimation and intense photophobia. On the temporal corneal quadrant was a branching ulcer which resembled the twig of a tree or tendrils of moss. Zinc solution was ordered to be used every two hours. The next day the branching was more extensive, one tendril reaching the center of the cornea. The different ramifications of the ulcer were touched with pure carbolic acid, a subconjunctival injection of cyanide of mercury was given, and 25% solution of argyrol with atropin was prescribed for use in the eye every two hours.

The ulcer was now almost healed and took scarcely any stain.

Discussion.—Dr. Neeper had found applications of argyrol to the palpebral conjunctiva of the upper lid, of greatest help in treating a dendritic corneal ulcer.

Dionin in Interstitial Keratitis.

A woman, aged 58, was first seen by Dr. Black two years previous, when she gave a history of ulceration of the left cornea 15 years before, which got well after a year. Her baby then scratched her right eye, and she suffered the same way with it for about the same length of time. She wanted to know if anything could be done to improve her vision, which was R. E. 20/200; with plus 3.50 axis $90^\circ = 20/50$. L. E. 3/200, not improved. Both corneae were covered with nebular opacities. The right pupil dilated in a vertical oval and the left dilated uniformly. The right pupillary area showed, with the ophthalmoscope, horizontal striae which looked purely capsular, a few deeper opacities also being seen. No vitreous or fundus changes were seen in

the right eye, but the vitreous of the left eye contained a large fixed opacity on the nasal side. She was given 3 gr. thiosinnamin twice daily for two months; when it was discontinued because her vision had not improved.

Four months later Dr. Black found the vision of the right eye reduced to 20/70, with her glasses. She was now given 5% dionin salve, which she used for several months without improvement.

On April 11, 1908, she again called, stating that her right eye had been inflamed and painful for three months, and that she had slept but little on account of pain for three nights. Very marked interstitial corneal changes were noticed, especially over the lower half, with superficial pebbling, which stained very slightly. Under atropin the pupil was found to dilate irregularly because of posterior synechiae.

The only treatment prescribed was 5% dionin salve. The results were striking.

The cornea largely regained its luster, was no longer roughened, and the interstitial changes were clearing. The pupil was irregular and contained some exudate.

Jequirity for Trachomatous Pannus.

Dr. Black presented a patient to show the effects of jequirity at its height. The powdered bean was dusted into the eye thirty hours before, for pannus from trachoma involving one eye only. The palpebral conjunctiva had been studded with hard papillary granules, which were individually opened, and expressed or excised. The boric acid powder massage treatment had been used for two months, and a solution of sulphate of copper made from a 10% glycerole of copper (Prince) had been used at home. The conjunctiva was now quite smooth, with few cicatricial changes, but the pannus was quite dense. Jequirity has given Dr. Black good results in such cases.

Trachomatous Keratitis.

A woman, aged 55 years, had been under Dr. Black's care for two months. She had gone through all the ravages of trachoma and was in the cicatricial non-inflammatory

stage. Dr. John Green had operated upon her left eye some years before for entropion. She still had a few lashes, which she prevented from turning in by pulling them out. She wore an artificial eye over an old atrophied stump on the right side. Shortly before Dr. Black saw her the vision of the left eye became poorer than usual from a "scum coming over it." The left cornea was filled with nebulous opacities, both superficial and deep, discrete and confluent.

No inflammatory symptoms and no pain, but the eyeball was slightly injected. A few drops of methylene blue caused a staining of the cornea in the form of fine lines running in a vertical direction. This was probably due to scratches on the cornea from incurred lashes.

The pupil dilated under the use of homatropin, and 5% dionin salve was used at bed time, with possibly some improvement. The globe was no longer congested, but the vision was fingers at 4 feet, as when first examined.

Dr. Black desired suggestions as to further treatment.

Discussion.—Dr. Bane would use 4 or 5% mercuriol ointment daily, in the roughened cornea and cicatricial changes of old trachoma.

Dr. Coover had found 1 or 2 per cent. ichthyol ointment efficacious in lid hypertrophy.

Dr. Neeper had not found dionin so useful as some other remedies in treating corneal opacities.

Dr. Chase had seen hypopyon keratitis, with one-fifth of the anterior chamber filled with pus, clear in a few days under the use of 20 per cent. argyrol instillations.

Election of Officers.

The following were re-elected: Dr. G. F. Libby, Secretary; Dr. Melville Black, Treasurer; Dr. D. B. Strickler, Chairman of the Executive Committee.

Secretary's Report for the Year Ending April 18, 1908.

There are now twenty-five active members, four having been added during the past year. Leadville, Boulder, Greeley and Cheyenne are represented by one member each, Colorado Springs by six, and Denver by fifteen members.

Seven stated meetings have been held with an attendance

of 110 (67%) members and 24 visitors. Thirty-seven cases have been presented, 77 cases reported and 123 members and visitors have participated in discussion.

A symposium was held on the "Ocular Effects of Alimentary, Renal and Cardio-vascular Disturbances." Papers were contributed by one of our members and by three invited guests on this subject.

Largely as the result of the efforts of one of our members, an institution for the industrial training of adult blind of Colorado has been established in Denver.

Communications have been received from Prof. J. Hirschberg, an honorary member of this society.

In May a banquet was tendered Prof. Carl Hess by members in Denver, and he was driven about the city and given a mountain trip over the continental divide.

In addition to the printing of our proceedings in the *Ophthalmic Record* since December, 1906, the ANNALS OF OPHTHALMOLOGY and the *Journal of Ophthalmology and Otolaryngology* have requested these reports during the past year, and are now publishing the same regularly.

GEORGE F. LIBBY,
Secretary.

PROCEEDINGS OF THE OPHTHALMIC SECTION OF THE ST. LOUIS MEDICAL SOCIETY.

Meeting of March 11, 1908.

Dr. J. F. Shoemaker presented a case of negroid chorioid in the right eye of an American child, the left eye being the normal eye of a person of light complexion. The iris of the right eye was also much darker than that of the left eye and there were numerous dark-colored spots in the sclera.

Discussion.—Dr. John Green, Jr., thought that this might indicate some remnant of negro blood of remote ancestry. It would be very interesting to have the patient examined with that point in view.

Case of Siderosis of the Right Eye, Caused by a Piece of Iron-scale Which the X-ray Failed to Locate.

(Presentation of patient.) HENRY MEUTZE, M. D.

In the morning of September 24, 1904, the patient, a cabinet maker, now 49 years old, while cutting off a bolt, was struck in the right eye by a piece of iron-scale. He kept on working, and when he presented himself in the afternoon for treatment, the condition of the right eye was as follows: Shallow cut in outer part of margin of lower lid; a small perforating wound in inferior, exterior quadrant of cornea; irido-dialysis, and upon dilatation of the pupil, a small dark opacity in outer lower quadrant of lens was observed. Other media clear, fundus normal, vision 20/20. Patient had no conception of size of piece of iron-scale which struck him and two x-ray examinations proved negative. It was then assumed that a larger piece had struck the eye-ball and dropped off, and that what at first appeared to be a foreign body in the lens was nothing more than partial traumatic cataract. After appropriate treatment, patient was discharged three weeks after the injury with normal vision. About four months later he presented himself again, for reading glasses, and the condition of the right eye was the same. About a year after the injury the entire lens had become cataractous and the iris, naturally gray,

had assumed a brown color; it was rust-stained. From now until October 19, 1907, when successful extraction with iridectomy was performed, the patient had several attacks of irido-cyclitis, which were easily controlled by the usual remedies. The heavily rust-stained lens was examined carefully, but no foreign body was found. It was undoubtedly absorbed and deposited again as hydroxide, causing the uveitis, from which the eye is still suffering at present. The eye is perfectly quiet; vision is still improving, and with plus 11.00. D. S. is 1/10. The failure of the x-ray to reveal the piece of iron-scale is explained by the fact that in its shortest diameter, it must have been too thin to offer sufficient resistance to the ray, and the picture through the longer diameter was easily obliterated by diffusion of ray from the cranial bones. In a similar case, the giant magnet would be called to aid, besides the x-ray.

Discussion.—Dr. M. H. Post asked if the Doctor had tried the sideroscope. They had had excellent results from the use of it under the management of Dr. Ewing.

Dr. Meutze said he had not. The experience of this case had taught him not to depend entirely upon the x-ray. Iron-scales offered very little resistance to the x-ray and in this case the piece must have been very small indeed. There were numerous large and small opacities in the vitreous. The iris now looked rusty and brown and the oxid had set up a uveitis with all its consequences.

Dr. Jennings suggested that since the picture had been taken, four years ago, a great improvement has been made in the technique of radiography, and perhaps now a similar case would be shown in the plate.

Primary Epibulbar Melano-Sarcoma.—JULIUS GROSS, M. D.

Sarcoma of the conjunctiva may be counted among the diseases that occur very seldom. Lyder Borthen found it only eight times in a series of 45,000 cases of diseases of the eye. Clegg and Hall state that only three cases were observed in an examination of 520,523 out-patients at the Manchester Royal Eye Clinic. Verhoeff and Loring, in searching the records of the Massachusetts Charitable Eye and Ear Infirmary found only two cases among 44,719 patients.

According to Koepfel sarcoma of the conjunctiva is most apt to occur at the age of 60 to 70 years. However, it may occur at any age. Many writers (among them Verhoeff and Loring) believe that immediate enucleation is the safest and best operation in these cases. However, others (among them Saemisch) believe that an effort to save the eye should always be made.

Melano-sarcomata have usually been classed as sarcomata, although some writers have held that it would be better to class them with epitheliomata. Among those who consider them as sarcomata are: Saemisch, Greeff and Axenfeld. Panas believes them to be epitheliomata. Leber also inclines to this view. Virchow speaks of sarcoma carcinomatoides. Ribbert, Professor of Pathology at Göttingen, in his text book on tumors (*Geschwulstlehre*) devotes considerable space to this subject, which he has also illustrated with splendid original drawings of melano-sarcomata, or as he prefers to call them, melanomata. Ribbert says: "All melanomata, whether of the skin or of the eye, must be placed in a single group. Secondly, these tumors must, because of their characteristic behavior, necessarily be traced to certain cells in which the ability to form pigment is inherent. We must not think that a new growth of any kind may now and then form pigment. The melanoma is a typical neoplasm, just as typical as any other. As the chondroma develops from a proliferation of the cartilage cells, the carcinoma from a proliferation of the epithelium, so the melanoma develops from a proliferation of the pigment cells, the chromatophores. Therefore I call the growth chromatophoroma.

Report of Case.—M. F., female, age 21 years, of medium stature, dark brown hair, dark brown eyes, presented herself May 27th, 1906, because of a growth at the nasal limbus of right cornea.

Family history good. No history of neoplasm or any other hereditary predisposition. Patient has never had any trouble with her eyes. No history of any injury. Previous general health good.

About six months ago members of her family noticed something like a scratch at the nasal limbus in the horizontal meridian of right cornea; soon after this the small black

mass of the tumor was noticed. Since it was first noticed, it had grown slowly but steadily. For the last six months or so she has not been feeling well, no particular complaint, just a general indisposition. One year ago she weighed 148 pounds, but now weighs only 122.

In the horizontal meridian of the right eye at the nasal limbus of the cornea there is a black growth measuring 2 mm. in the vertical, 1.5 mm. in the horizontal, and rising above the level of the globe about 1.5 mm. The growth rises abruptly at the corneal side to descend gradually to the conjunctival end. The base is somewhat constricted so that the edges protrude flap-like over the base. It is firmly and immovably attached to the corneal limbus. Its color is a shining black. There is no increased vascularization near the tumor nor elsewhere on the globe. The color of the iris is a dark brown. There are no naevi pigmentosi nor pigment spots noticeable in the circumcorneal zone. The fundus is normal and there is no sign of any growth in the eyes or elsewhere so far as I was able to ascertain.

With the kind advice, and under the direction of Dr. A. E. Ewing, the tumor was removed in the following manner: It was firmly grasped with forceps and trimmed off from the cornea with a broad double-edged round pointed knife having its cutting edge at the end. In a like manner it was cut off from the sclera. The site of the wound was then carefully curetted with the knife, and a small suture placed in the conjunctiva.

The wound healed nicely with scarcely a scar. There has been no recurrence at this date (after twenty months). The vision is as good now as before the operation.

Microscopic examination shows that the tumor is covered by the epithelium, which does not dip into the growth. There are three well-defined pigmented areas of dark brown color in which there are many cells, of medium size, containing pigments; there is also pigment in the intercellular substance. Surrounding these areas there are many smaller roundish cells, which make up the greater part of the tumor. The tumor cells are invading the conjunctival tissue. The blood vessels are not very numerous. The pigmented cells

are chromatophores, and the smaller round cells are also chromatophores which have not developed pigment.

Discussion.—Dr. Adolph Alt had seen several of these cases and had seen one unpigmented sarcoma. That was about twenty years ago. The patient had a tumor at the corneoscleral margin. He had removed it and in a few weeks it returned and he had again removed it. After three months it returned and the eye was removed. This man had, within the last year, been operated upon for a tumor of the trachea. Of course the papilloma of the trachea had nothing to do with the sarcoma. The peculiar cells found in these tumors made it exceedingly difficult to determine whether they were epitheliomata or not.

Melanoma of Iris.—Presentation of Patient.

Dr. F. E. Woodruff. Miss E. S., age 22, presented herself for treatment, with the following history: About two years ago she noticed a black streak at the inner lower quadrant of the right eye, in the anterior chamber, the growth extending from pupillary margin to the circumference of the iris. She noticed no change in this black streak for some two years, but in the last three months it has increased considerably in size until it now occupies the inner lower fourth of the anterior chamber. There has been at no time any pain nor any ciliary injection so far as I could learn; no symptom of neoplasms in other parts of the body. The presence of this melanoma may indicate either a benign or a malignant condition, but simple melanomata are frequently only the precursors of malignant condition. The rapid growth during the last three months would point to malignancy. The growth seems to be a proliferation of the pigment stroma. Without microscopical examination it is impossible to make a positive diagnosis. This the patient refuses to have done. The condition, however, I believe to be one of malignancy, and the ultimate outcome will be an enucleation.

Discussion.—Dr. Adolph Alt thought it was a primary melanosarcoma of the iris. These tumors grow very slowly. As to whether the eye should be at once removed, he suggested that an iridectomy be done and the specimen turned over for examination. In a number of cases such a

sarcoma had been removed by an iridectomy with no return of the condition. It would be worth while to make the attempt, at least.

LLEWELLYN WILLIAMSON, M. D.,
Section Editor.

TRANSACTIONS OF THE OPHTHALMOLOGICAL SOCIETY OF THE NETHERLANDS FOR 1906.

Translated by D. A. Kuyk, M. D., Richmond, Va.

Dr. W. M. DeVries spoke at some length upon the original investigations, made by the late Van Genderen-Stort who died in Haarlem, October 8, 1905, on the influence of light upon the movement of the rods, cones and pigment layer of the retina.

This research and investigation made upon cold blooded animals was pursued in the most scientific and painstaking manner, extending over a period of many years and, it is believed, has added much to the positive knowledge concerning the behavior of these structures when physiologically stimulated.

After a review of his methods of procedure, comparing them with the methods employed by others and their deductions, he concludes: The most important results of Van Genderen-Stort's investigations consist in the demonstration of the anatomical and chemical alteration, by the light ray, of that part of the retina, the cones, and the pigment layer, to which is attributed the function of visual acuity and the color sense. Similar demonstrable alterations occur in the rods when visual effort is exerted in a weak light. He held that light stimulus caused a vibration in the cones whose movement is exerted in the direction of the external granular layer. This the speaker regarded as a theory which has not yet been definitely demonstrated.

Dr. Nicolai, discussing the paper, said he had observed similar phenomena but it is necessary to accept with caution the view that the physiological action of these structures in man is analogous to that observed in the frog.

Dr. Noyon read a paper on *The Preliminary Iridectomy and The Formation of Cataract Following It*.

He defends and recommends preliminary iridectomy in uncomplicated as well as the complicated cataracts. About 1890 was begun the fight against the combined operation. In France the location of the incision was changed from scleral to corneal when the performance of the iridectomy was considered superfluous. There was then a return to

the classical method of Daviel, who never admitted the necessity for an iridectomy, considering it an unnecessary procedure good only for those who still followed the Prussian method of the scleral incision and who, of course, knew not what else to do with the frequently prolapsing iris. The simple extraction has had a triumphal march throughout the world and many thousands have been relieved of their cataracts without, as a certain famous surgeon said, "mutilation of the iris." It is Noyon's observation that the warmest advocates and adherents of simple extraction belong to those who are ever fond of keeping themselves before the public, but that the followers of the combined extraction, satisfied with the excellent results obtained with the combined method, take no part in the disputes concerning the relative advantages claimed for simple extraction, preferring rather to let their results speak for themselves, and thus to let time and succeeding generations judge accordingly. Naturally each operator will adopt a method in which he is adept and which is satisfactory alike to himself and to his patients. So after many disputes a form of compromise seems to have been reached. There are those who adopt the simple extraction in the majority of their cases. Then again others have discarded this method, and have returned to the combined operation. If then one takes the average of modern writers he will find the two methods about equally advocated, but with the general advice that where there occurs the slightest difficulty, or if there is found the least complication, then an iridectomy is altogether the safest measure to adopt. Since no one can, by any possibility, foresee the difficulties that may arise during an operation, certainly it is equally impossible to predict what they will be, following it, hence I have always felt most secure in employing the combined method although admitting that this method does lengthen the duration of the operation and makes it more painful, and also that hemorrhage from the iris may more or less obscure the field of operation. Having done the simple extraction in many cases, and while being impressed with the facility with which it is done, yet there has always occurred the disappointment of the difficulty experienced in the removal of any remaining cortical substance, there is always before

one the fear of the possibility of iris prolapse which could have been altogether obviated by an iridectomy.

I consider simple extraction indicated in very nervous or hypersensitive patients, who might react unfavorably after an iridectomy. Especially is it the operation of election in hemophiliacs whose blood vessels should ever be spared all possible injury. It has always been difficult for me to remove any remaining cortical substance after a simple extraction and to obtain a perfectly clear pupil. When a coloboma is made it is accomplished easily and completely. The long manipulation necessary to remove any remaining lens substance after removal of a cataractous lens, such as required after the simple extraction, is always dangerous. Aside from the danger of infection there is always more or less danger from what the patient himself may occasion. There is nothing to assure you that the patient will not become recalcitrant and unmanageable. Each patient during the operation, labors under considerable nervous tension and is therefore not strictly responsible. Everything then, that can possibly hasten the operation after the delivery of the lens is of the first importance. I can therefore see no objection to the iridectomy when there is no apparent danger of prolapse of vitreous and when it is kept in place by the lens. The advocates of the simple extraction have claimed many advantages for their method. Among others is mentioned that the intact iris better protects the vitreous against infection; it is also claimed that an undisturbed iris action follows simple extraction, but they evidently forget that in a great many cases, innumerable and almost invariable small adhesions form between the iris and lens capsule, and interfere with the free action of the iris. Mention is made of the "blinding through the coloboma." If the iridectomy is made small and covered by the upper lid, then this alleged discomfort will not occur. Claim is made that visual power is better following the simple extraction. How can this be demonstrated? No one has ever, for purpose of comparison or demonstration, operated upon identical cases with and without iridectomy, and when perfect vision depends upon so many conditions, such as the transparency of the lens capsule and its more or less folded condition, and of the operation-astigmatism of the cornea, the comparison of results from any method become still more difficult. One

argument in favor of simple extraction I cannot refute; to-wit, the possibility of the engagement of cortical substance in the corneal wound following combined operation. This does, without doubt, occur more readily following combined extraction, and the few cases of post-operative glaucoma that one sees, when there is to all appearances a completely healed wound, follow the combined operation, but this apparent advantage is offset by the occurrence, in a great many cases in which simple extraction is performed, of serious hernia of the iris with subsequent glaucoma, and this brings me to my chief argument in behalf of combined extraction. It is anything but pleasant for the patient to be obliged to return again to the operating table the day after the extraction and submit himself to another painful operation. Should complete anesthesia be necessary then the nerve shock is highly intensified. It should be remembered that we have to deal mostly with aged people to whom general anesthesia is no mere bagatelle.

One asks, Why not do an iridectomy and thus avoid these serious complications? And no doubt this same question has presented itself to those, who, having once abandoned the combined extraction, have, after a time, returned to it.

I recall two cases in whom the extraction followed iridectomy done two months before. The first patient, an aged but restless man, by reason of his unrest and nervousness, reopened the corneal wound at least ten times. The other one, while more phlegmatic, yet on the third day after the operation experiencing an itching in the eye thoughtlessly inserted his fingers beneath the aluminum shield and vigorously rubbed it until severe pain awakened him to the injury he had done himself. As a result of his meddlesomeness he had a large intraocular hemorrhage and re-opening of the corneal wound. Both patients made an uneventful recovery. Both patients have vision equaling $\frac{3}{5}$, but I shudder to think what the result would have been had the simple extraction been employed.

If now one will combine the advantages of the two methods, then preliminary iridectomy should be done some time prior to the extraction. This has the most beneficial effect, and possesses the following advantages: The patient

who, perhaps for months, has been anticipating the operation of lens extraction, has passed through the experience of an operation. He has learned and realizes how slight an affair it is to him, the short duration of the operation itself, and the insignificance of pain; becomes accustomed to the enforced quiet and rest, which must needs follow the operation; becomes acquainted with the hospital and its customs, and becomes familiar with the manner of the surgeon. He undergoes a training for the actual lens extraction. The only pain that can occur is that caused by the preliminary iridectomy. I have had patients who greatly feared the operation, but after the preliminary iridectomy submitted to the lens extraction without the least hesitation or fear. The iridectomy enables the operator to make certain observations which will be of an incalculable service to him and to the patient when the extraction is done. He now has before him a free and open field of operation. Is secure in the knowledge that there is no possibility of the iris interfering with the free and easy delivery of the lens; that there can be no hemorrhage to obstruct the field of operation; that the patient will suffer no pain or distress; that he has the complete confidence of the patient by reason of the successful preliminary iridectomy. It should not be forgotten that the after-treatment is very simple. I admit that to perform two operations when possibly a like result may be obtained with only one is a matter of no slight moment, and in this day of haste and hurry, it may not always be possible to find the patient who will submit to the double operation. I also admit that one meets with cases that should not be subjected to the shock incident to the double operation. It is necessary here, as elsewhere, to select carefully one's cases and to individualize, then if one can explain satisfactorily to the patient the advantages and the desirability of the double operation, one can do the preliminary iridectomy before the lens is operable. It is claimed that the double method subjects the patient to two separate exposures to infection. Because of the comparative immunity against infection of all iris wounds, this gives me but slight concern. There remains to be considered the increased cost to the patient incident to the preliminary operation, and to the extra work upon the surgeon.

The text books speak of the preliminary operation as unnecessary in uncomplicated cataracts. An occasional writer advises it when the patient has only one eye. Is it possible to have more definite testimony in its favor than this? I always consider and treat each case as if the patient had only one eye to risk and do not allow myself to be influenced by the fact that there remains another eye in reserve. One could say with equal propriety: "Sterilize well your instruments before you operate, but sterilize them with extra care when your patient has only one eye." I have had occasion to employ the lens massage as advocated by Förster, but I have not observed any effect upon the opacity of the lens. Perhaps I did not employ sufficient force. Inasmuch as our ideas concerning the necessary degree of opacity of the lens have undergone so much change, and since we are dealing with greater liberality, those cases of cataract in patients of sixty years and over, I have come to regard massage of the lens as unnecessary, hence I have not for several years past employed that method. I remarked a while back that I trusted to the iridectomy to hasten the opacity of the lens, but positively to prove this is a most difficulty matter. The development of a senile cataract is so irregular that it is almost impossible to say just how it would have advanced without the iridectomy. In the last year I have had two cases of lens opacity following iridectomy that surprised me no little. Both iridectomies were indicated, in different patients, by subacute glaucoma. In neither case at the time of the operation was there any opacity of the lens. In one patient the second eye had a perfectly transparent lens, the opposite eye had had absolute glaucoma and consequently was totally blind.

I did an iridectomy in both patients. Between two and three months following I observed the formation of a cataract which was in due time removed. In one case this was easily done. Following the iridectomy the tension of the eye became normal, and the anterior chamber returned to its usual depth. In the second case the tension continued high, the anterior chamber shallow. The extraction was most difficult but possible. I have, of course, considered the possibility of wounding the lens with the knife. In one case, because of the restlessness of the patient, this was possible. But in the other I am positive that the lens was

not injured. In both cases opacity of the lens began shortly after the iridectomy. The development was, however, too slow and regular to have been of a traumatic nature, besides, there was total absence of any irritation symptoms.

In neither of my cases was there any possibility of accidental contusion. Cases of contusion cataract have become quite common in recent years. Schirmer reports experiments made on animals in which after opening of the anterior chamber the lens was touched with the back of the knife. He observed the occurrence of opacity at the site of the irritation, but it always cleared up, the lens becoming again transparent. In many cases the opacity was progressive. The possibility of tearing the zonula during the opening of the anterior chamber must receive consideration. If this occurs the lens will be pressed forward. The tearing of the zonula will interfere with the nutrition of the lens and thus produce opacity. This would be to all intent a traumatic cataract. How can this possibly occur in an old person without the slightest evidence of irritation when it requires at least two months after the iridectomy for the lens to become totally opaque? I do not think the theory of traumatic cataract tenable. The most plausible explanation, it seems to me, is the injury,—tearing, of the zonula. If any of my confreres have had similar experiences and can give better explanations for these phenomena, I shall feel indebted to them.

Discussion.—Professor Koster saw a case who had lost one eye from chronic glaucoma, the other eye undergoing an acute attack was iridectomized. Six months later there was seen the beginning of a slowly developing cataract. Of the possibility of injury of the capsule, or of tearing of the zonula there was no question. Probably the cataract would have occurred had there been no iridectomy. As opposed to this he saw a case of traumatic cataract following an iridectomy in both eyes for chronic glaucoma, the operation having been done by another surgeon.

Dr. Nicolai spoke of the treatment of ulcer of the cornea with hypopyon with salicylate of zinc. For some time past I have experimented with the bactericidal power of salicylate of zinc. While the results have not in every particular been positive, I am convinced that the effect upon some bac-

teria, among them *diplococcus pneumoniae*, is very considerable. These experiments led me to employ salicylate of zinc in ulcer of the cornea with hypopyon, with the hope of controlling this very serious ocular inflammation. I have not been disappointed in my expectations. Recently I have treated eight cases of this inflammation. In five there was implication of the lacrimal canal, and in four I was able to demonstrate the presence of *diplococcus pneumoniae*, proving that this *diplococcus* is one of the exciting causes of this serious inflammation. In the majority of cases the superficial epithelium was entirely destroyed, while in the anterior chamber there was very considerable collection of pus. All these cases were treated with a 2 per cent. solution of salicylate of zinc. This was instilled every two hours with especial instruction that the solution come in direct contact with the ulcer. The lacrimal canal was syringed with this solution once daily. Whether it was a coincidence or the action of the medicine, it so happened that all the cases pursued an uninterrupted recovery. It was very noticeable in each case that the suppuration was materially lessened, so that there was never a great collection of pus in the anterior chamber. Incision of the ulcer was not necessary. The excellent result obtained in all these cases has led me to bring this to the notice of the society.

For some time past I have been making cultures of bacteria obtained from between the cilia of lids affected with blepharitis when to my astonishment there appeared along with the ubiquitous staphylococci (*Albus* and *Aureus*) other micrococci which were only very slightly, if at all, affected by the usual staining methods. Naturally the thought presented itself that I had discovered a new bacterium, perhaps the specific bacterium of blepharitis. I employed every method possible to separate these colorless bodies from those which were stained, but without success. In every culture, it mattered not what agent was employed, both kinds of bacteria invariably appeared together. Finally on a preparation of acetic agar it was observed that these two bodies were unusually close together; in some instances one was lying partly on top of the other, when it occurred to me that probably the stained bodies were coming from within the unstained bodies; that the unstained portion was

the capsule of the stained body. Simultaneously with this observation it was noticed that gradually, from every conceivable kind of preparation, the unstained bodies vanished. At the end of a week they were entirely absent. The preparation from which the original observation was made shared a like fate. I can, therefore, offer no preparation to permit a control experiment of my finding. I have here under the microscope a slide whose appearance, as you can see, corroborates my observations. You will observe some parts have the appearance of a honeycomb. These portions are but slightly stained, while scattered promiscuously about in them are strongly stained bodies, and while swimming about them are a number of intensely stained bodies; —cocci. It appears as if the capsule has extruded its kernel, its contained stained body.

In every preparation that I made by spreading the culture undiluted upon the cover glass, these two bodies were found. Throughout the literature that I have examined I have found nothing concerning the capsule of the staphylococcus. An occasional writer mentions the unequal staining of the bacteria. If these bodies that I have observed are actually capsules, then in some respects they differ materially from anything so far known. Firstly, because they have a sharply defined body. Secondly, because they are easily cultivated and separated. Not only on acetic agar and on pure agar, but also on glycerine they are easily propagated.

BOOK REVIEWS.

The Development of Ophthalmology in America.—1800 to 1870.

BY ALVIN A. HUBBELL, M. D., Ph. D., Buffalo, N. Y. Published by W. T. Keener & Company, Chicago. 1908.

This contribution to ophthalmologic history and biography was originally presented in abstract as an address before the Section on Ophthalmology of the American Medical Association, June 5th, 1907.

In its present form it has been completely revised and extended by the addition of numerous cuts and changes in the text, and deals in a delightfully interesting and instructive manner, with those elements and factors which aided in the establishing and developing of an American Ophthalmology. To those who have appeared on the field of ophthalmology during the last twenty years, the science must certainly have seemed to be old and well established, and perhaps little thought has been given to the struggle of pioneers who worked so hard and faithfully to that end. We learn from Dr. Hubbell what their hardships were, and how they untiringly pursued their efforts, until we have indeed a specialty founded on rock bottom and capable of infinite growth.

Dr. Hubbell first sketches the earliest American Ophthalmic Institutions and their surgeons, and notes that the first effort of the kind was made in New London, Conn., in 1817 by Dr. Elisha North. This was quickly followed in 1820 by the New York Eye Infirmary, among whose founders was Dr. Edward Delafield. This remarkable institution, since it opened its doors in August, 1820, with the exception of three months, has never been closed, and up to September 30th, 1906, has cared for more than one million patients.

Through the efforts of Dr. George McClellan of Philadelphia, the third attempt to establish an institution for the treatment of the eye, was made in that city in 1821. This institution Dr. Hubbell tells us was short lived and was last heard of in 1824.

A number of other institutions were established in different cities, and in 1834 the Wills' Eye Hospital in Philadel-

phia opened its doors for the reception of patients. This hospital has a record of which it may well be proud, and has steadily grown in its usefulness, from treating sixty cases its first year to some sixteen thousand annually at the present time.

Dr. Hubbell then devotes a chapter to biographical sketches, and gives interesting accounts of George Frick, Isaac Hays, and Squier Littell, whom he designates as the three pioneers in ophthalmic practice, as well as to a number of other men whose names are indelibly graven in the history of ophthalmology.

American literature on ophthalmology during the first half of the nineteenth century is described in chapter four, and will be found most interesting reading. This is followed by some of the special American contributions to ophthalmology, and by a history of the transition period from ophthalmology of the physician and surgeon to ophthalmology of the specialist. More biographies of the early specialists are then included, and finally other factors of advancement, and a brief sketch of the new American ophthalmology.

Dr. Hubbell has performed a great service in bringing before the profession such an interesting and instructive history of ophthalmology, and this little book should be in the possession of everyone interested in the subject.

Although covering very thoroughly the ground intended, one name will be missed which would naturally be looked for by many in a work of this kind; that of the late Dr. Wm. F. Norris of Philadelphia. Another name intimately associated with certain branches of ophthalmology is that of Dr. S. Wier Mitchell. Mention is made of Dr. Mitchell in connection with experimental work on saccharine cataract, but his greatest influence on ophthalmology was exerted along other lines.

Dr. Hubbell might have closed his history at a little later date and thus included a coterie of men who have been very potent factors in the development of ophthalmology, and yet who would stand distinctly apart from most of the present workers. They belonged to a generation which now has but few survivors.

It is to be hoped that the author will follow the sugges-

tion in his preface, and tell the story of the progress of ophthalmology from 1870 to the present time.

WILLIAM T. SHOEMAKER.

The Ophthalmic Year Book—Volume V.

BY EDWARD JACKSON, A. M., M. D.; GEORGE E. DE SCHWEINITZ, A. M., M. D., and THEODORE B. SCHNEIDEMAN, A. M., M. D. Published by the Herrick Book and Stationery Company, Denver, Colorado. 1908.

The fifth volume of the Year Book under the authorship of Doctors Jackson, de Schweinitz and Schneideman, has just been issued and is believed by the authors to excel any of its predecessors in the completeness of its review of ophthalmic literature for the preceding year. The form and arrangement are unchanged, and the book is particularly well indexed, permitting of ready and easy reference either to subject matter or contributors to articles noted.

The Year Book has become a necessary part of the working ophthalmologist's equipment and saves an immense amount of labor for those interested in ophthalmic literature.

In possessing the present Year Book and its four predecessors, one cannot help but feel that he is constantly in close touch with all of importance which the ophthalmologists of the world are contributing to their speciality.

American ophthalmologists in particular, are greatly indebted to the authors for their careful and painstaking work, and the book is commended to all ophthalmologists, not only to have but to read.

WILLIAM T. SHOEMAKER.

NEWS AND NOTES.

The American Academy of Ophthalmology and Otolaryngology will hold its annual meeting in Cleveland, Ohio, August 27, 28 and 29.

The preliminary program which has recently been issued gives promise of a most interesting and instructive session for both sections.

The Society is fortunate in having as its guest this year Dr. J. B. Lawford of London, England, who will deliver the address on ophthalmology, the subject of which address has not yet been announced. In addition, twenty-four papers are listed to be read and discussed by the members as follows:

1. Address: On Ophthalmology (Subject to be announced later). Dr. J. B. Lawford, London, Eng.
2. President's Address: The Limitation of Ophthalmic Practice. Dr. D. T. Vail, Cincinnati, O.
3. Sympathetic Ophthalmia following Mules' Operation. Dr. Harold Gifford, Omaha, Neb.
4. Is Menier's Disease of Ocular Origin? Dr. F. Park Lewis, Buffalo, N. Y.
5. Diseases of the Lacrimal Apparatus, Etiology and Treatment; with Special Reference to Extirpation of the Sac. Dr. Chas. S. Means, Columbus, O.
6. Exophthalmic Goitre. Dr. Albert R. Baker, Cleveland, O.
7. Increased Tension in Ocular Diseases of Infancy and Childhood. Dr. J. E. Brown, Columbus, O.
8. Ophthalmic Physician and Surgeon or "Oculist and Aurist"—which? Dr. Lucien Howe, Buffalo, N. Y.
9. Post-Operative Sympathetic Ophthalmitis. Dr. Don M. Campbell, Detroit, Mich.
10. A New Method of Tendon Shortening, Presentation of Instruments. Dr. H. H. Briggs, Asheville, N. C.
11. Pseudo-Optic Neuritis. Dr. T. B. Schneideman, Philadelphia.
12. Refractive Myopia. Dr. Francis Valk, New York City.
13. Operative Treatment of Persistent Glaucoma. Dr. Percy Fridenberg, New York City.
14. Upward Dislocation of the Lens of Traumatic Character. Dr. W. F. Mittendorf, New York City.

15. Two Cases of Parinaud's Conjunctivitis with Remarks. Dr. C. Barck, St. Louis, Mo.
16. Analytical Description of Eye as an End Organ. Dr. Joseph E. Willetts, Pittsburg, Pa.
17. Hereditary Blindness and Its Prevention. Dr. Clarence Loeb, St. Louis, Mo.
18. The Mind of the Patient. Dr. Sam C. Norris, Anderson, Ind.
19. Metastatic Carcinoma of the Chorioid—a critical study with case report. Drs. Geo. F. Suker and Lorenzo N. Grosvenor, Chicago.
20. The Calmette Ocular Tuberculin Reaction for the Diagnosis of Tuberculosis. Dr. Geo. F. Keiper, Lafayette, Ind.
21. An Epidemic of Pneumococcus Infection and Remarks on Acute Conjunctivitis. Dr. Adolph Alt, St. Louis, Mo.
22. Superficial Keratitis. Dr. T. W. Moore, Huntington, W. Va.

SYMPOSIUM.

Ophthalmic Pedagogy. •

23. Teaching of Ocular Pathology. Dr. C. A. Wood.
24. Refraction. Dr. Edward Jackson.
25. Ophthalmology for Students of General Medicine. Dr. Leartus Connor.

The forty-fourth annual meeting of the American Ophthalmological Society, was held in New London, Conn., at the Hotel Griswold, July 15 and 16. Thirty papers were presented, and the Society had the pleasure of hearing Major Smith describe his method of Cataract Extraction in the Capsule. This operation has been performed by Major Smith, in India, about seventeen thousand times.

Dr. S. B. St. John of Hartford, Conn., was elected president, and Dr. Wm. M. Sweet of Philadelphia, secretary. Dr. St. John has served the Society as secretary for twenty-one years.

The Alverenga Prize of the College of Physicians of Philadelphia for 1908, has been awarded to Dr. William T. Shoe-

maker of Philadelphia, for an essay entitled, "Retinitis Pigmentosa, with an Analysis of Seventeen Cases Occurring in Deaf Mutes; Including Laboratory Examinations of the Blood and Urine in Eleven Cases." The laboratory examinations were made by Dr. John M. Swan of Philadelphia.

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MIXED STREPTOCOCCUS AND PNEUMOCOCCUS INFECTION OF THE ORBIT AND ADJACENT SINUSES.*

CHARLES STEDMAN BULL, A. M., M. D.,
NEW YORK.

The subject of pneumococcus and streptococcus infection has developed great importance and interest during the last two or three years, within which period this particular form of infection has greatly increased in frequency and gravity. Prof. Osler has called attention to the fact that this increase is especially pronounced in the United States. During the last year the infection has been so widespread that the subject seems to demand organized systematic study and investigation, from the standpoint of preventive medicine.

The conditions attributable to this infection are very numerous and of great variety. We have as yet no certain knowledge of the mode of transmission of the infection, whether lymphatic or hematogenous, and it is just along these lines that our research work must be done.

One of the singular conditions prevailing is the widespread prevalence of pneumococci and streptococci in apparently healthy persons. Clinically speaking, the most marked feature of the infection seems to be the extraordinary variability in the virulence of action of the germs.

* Read before the American Ophthalmological Society, July 15, 1908.

For instance, in the *Journal of the American Medical Association* for January 6th, 1906, appears the report of a series of twelve cases of brain infection by the pneumococcus, in which the same channel of infection was determined, viz: Otitis media following traumatism, followed by septicemia and acute pneumonia.

In the same journal for May 2d, 1908, Green reports a case of brain infection, with rigidity of the neck, Kernig's sign on both sides, low delirium and moderately high temperature with normal fundus. In this case the channel of infection could not be determined.

In the *Medical Record*, vol. lxxv, p. 215, Gruening reports a case of pneumococcus infection through the nose, ending in orbital cellulitis.

At the first operation, the orbit, ethmoid cells and frontal sinus were curetted and drained. Cerebral symptoms followed, and a second operation disclosed a large abscess in the frontal lobe. Pneumonia followed and death ensued in five days.

In a series of sixty-five cases of conjunctival infection reported by Smith, the pneumococcus was found to be the cause in twelve cases.

In ten cases of corneal infection the streptococcus was the cause in four cases.

In ten cases of infection of the lacrimal sac the pneumococcus and streptococcus were found in seven cases.

Haltenhoff reports a case of severe conjunctivitis, diphtheritic in character, in a child nine months old, which extended to the eye and orbit, and the infection was found to be due to a mixed infection.

De Schweinitz has reported a case of bilateral pneumococcus conjunctivitis, which later involved the cornea, but which healed without infection of the deeper corneal tissue by the virulent secretion.

During the past winter and spring, I have seen a goodly number of cases of severe inflammation of the eye and its adnexa, due to a mixed infection by the pneumococcus and streptococcus. Of these cases quite a number involved the orbit and adjacent sinuses, and of these I have selected six of the most virulent for presentation to the Society. It was not possible in every instance to trace the channel of infection, but there seems to be little doubt that in four of the six

cases the infection began in the nose, and thence spread to the orbit and neighboring sinuses.

The points which I desire to emphasize in the study of these cases are as follows:

First—The marked insidiousness of the attack, and the varying duration of the period of incubation.

Second—The extreme violence of the symptoms in the sudden onset of the attack.

Third—The very rapid rise of temperature and the equally sudden fall after operative interference has opened the purulent deposit.

Fourth—The rapid development and violence of the symptoms point apparently to an unfavorable prognosis.

Fifth—Immediate and active interference, with free incisions, through curetting and irrigation, and prolonged and careful hunting for the purulent foci, soon bring about a more favorable condition.

Sixth—The necessity for great vigilance in watching the cases and searching for new foci on any sudden and rapid rise in temperature.

Seventh—The patients were all young, the oldest being twenty-one years, and the youngest nine months old.

Eighth—In only one case was the eye lost from suppuration.

CASE I.—*Infection of Nasal Mucatus, Ethmoid, Orbit, Frontal Sinus and Lacrimal Gland.*

G. S., man, aged 21, first seen January 4, 1908. The patient stated that for a week or more he had noticed a dull pain high up in the nose, and that he could not breathe through the left side of his nose. On December 29, 1907, five days before I saw him, the left eye became slightly inflamed, and this condition remained unchanged for two days. Then suddenly the pain became very severe in the orbit and forehead, the eye began to protrude, the lids became swollen, and the swelling began to extend upwards upon the forehead, outwards on the temple, and downwards on the cheek. When I saw him on January 4th, both eyelids were enormously swollen and so tense and hard that they could not be opened. The tissues on the forehead, temple and cheek became boggy. The patient's temperature was $101\frac{3}{5}^{\circ}$, his respiration was 26, and his pulse was 64. A careful rhinoscopic examination

showed a very swollen mucous membrane, and pus coming from the superior nasal meatus. Transillumination of the maxillary antrum and frontal sinus proved negative.

The patient was admitted to the hospital the same day, and a long incision was made into the orbit just below the supra-orbital margin. A probe passed in various directions discovered no pus, but revealed erosion of the roof and inner wall of the orbit. After free irrigation, a stout grooved director was introduced and passed at once freely into the superior nasal meatus, ethmoid cavity and frontal sinus. The periosteum on the roof of the orbit was eroded almost to the apex of the orbit. The ethmoid cavity was completely curetted, and fragments of bone and broken down tissue removed.

The opening in the floor of the frontal sinus was enlarged with bone forceps, and the sinus was carefully curetted, and a mass of pus and broken down tissue removed. The septum between the frontal sinuses was found intact, but far on the right side of the median line. The opening into the nasal meatus was then enlarged and the meatus curetted, and a drainage tube introduced and free irrigation through the nose instituted. The eyeball was found in a state of panophthalmitis. After free irrigation with a bichloride solution, the orbital wound was packed with iodoform gauze and the drainage tube left in the nasal meatus. An examination of the pus and shreds of broken down tissue from the orbit, ethmoid cells and nose showed large numbers of streptococci and pneumococci.

On the next day the swelling and infiltration showed no diminution, and the patient lay in a stupor, with pulse 64, and temperature $102\frac{1}{5}^{\circ}$.

On January 8th the wound was enlarged towards the median plane, and a stout probe was introduced far back in the orbit on the nasal side, and at length near the apex of the orbit, after some resistance, the abscess was opened and about one ounce and a half of pus evacuated. The whole cavity, including orbit, ethmoid, antrum and nasal meatus, was carefully irrigated, and a careful examination was made of the roof of the orbit, but no opening into the anterior fossa of the skull was found. All broken down tissue was removed and the orbit packed with iodoform gauze.

The superficial cervical glands on the left side were inflamed and sensitive as far as the clavicle. The next day

there was a free discharge of pus and fragments of bone, and copious irrigation from the orbit into the ethmoid and superior meatus was ordered twice daily. The stupor became less marked and the temperature dropped to $100\frac{1}{5}^{\circ}$.

There was a slow but steady improvement until January 15th, when the temperature again rose to $102\frac{1}{5}^{\circ}$, and on the next day another collection of pus was discovered in the upper and outer angle of the orbit. This was freely incised and found to involve the lacrimal gland. The external canthus was divided, and the gland and all broken down tissue was removed. From this time the patient made a slow but steady recovery, and the temperature fell to 100° , and on January 28th to the normal. Irrigation of orbit, ethmoid and nose was done twice daily. The upper lid, which was enormously swollen, almost reaching to the ala of the nose, slowly retracted as the infiltration diminished. The irrigation was continued daily and the drainage tube retained in the nose until all discharge ceased, which was on March 2d. The patient was discharged on March 9th, nine weeks from the date of entrance into the hospital.

*CASE II.—Infection of the Nasal Meatus, Frontal
Sinus and Orbit.*

A. U., boy, aged 13. First seen February 1, 1908, and gave the following history: He had been ill with the "grippe" early in the winter, and since his recovery there had been a foul discharge from the nose. About two weeks before I saw him he noticed a dull pain in the left orbit, and three days later the left eye began to protrude. When I saw him, there were all the signs of orbital cellulitis—great swelling of the lids, chemosis of the conjunctiva, exophthalmos, the protrusion being directly forward and the eyeball being almost immovable. The temperature was 102° , and there was severe pain. Palpation through the upper lid above the eye seemed to indicate the presence of pus just beneath the fascia, and there was marked edema over the left supra-orbital region. Transillumination showed that the left frontal sinus was involved.

A long incision was made February 6th through the upper lid, just beneath the orbital arch, through the tarso-orbital fascia. A probe was introduced in all directions, but no pus

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was discovered. A stout director was then introduced, and far back near the apex of the orbit, the abscess was discovered and nearly an ounce of pus evacuated. This pus, as well as numerous shreds of necrosed cellular tissue were preserved for examination, and large numbers of pneumococci and streptococci were found. After careful irrigation of the cavity, further examination showed erosion of the roof, floor and external wall of the orbit, a small opening into the nasal meatus, and a large one into the frontal sinus. Both of these openings were enlarged, all fragments of bone removed, and the nasal meatus and frontal sinus were carefully curetted. The septum between the frontal sinuses, and the orbital plate of the ethmoid were intact, as was also the floor of the orbit. Free irrigation from the orbit through the nose was then carried out, and a drainage tube inserted in the nose.

On the next day the cornea was found to be anesthetic, and an ulcer appeared near the lower margin of the cornea, surrounded by a zone of infiltration. The edema of the supra-orbital region was more marked. The gauze packing was removed from the wound and the parts freely irrigated, but no new abscess was discovered. The orbit was loosely packed, and irrigation was ordered twice a day. From this time all the symptoms subsided. The cellulitis rapidly disappeared, the temperature fell to the normal on the eighth day, but rose again to $100\frac{1}{5}^{\circ}$ on two different occasions. The suppuration was quite free for four days, and then slowly diminished, but to the end the pus always showed the bacilli. The corneal ulcer did not perforate, and as the anesthesia disappeared the ulcer healed, leaving a rather dense opacity.

The patient's temperature ranged as high as $102\frac{2}{5}^{\circ}$, and at times the curve showed decided sepsis.

The patient was discharged cured on March 13th, all signs having disappeared, except a slight drooping of the lid.

CASE III.—*Infection of the Nasal Meatus, Ethmoid and Orbit.*

L. R., boy, aged 16. First seen March 11th, 1908.

This case was of special interest, because he presented an acute septic process grafted on a chronic inflammation of the nasal and frontal sinus. The patient about a year ago began to suffer from frontal headache, which soon became constant

and confined to the right side of the forehead. There was a dull ache in the orbit, and he had difficulty in breathing through the right nostril. An examination of the nose showed enlargement of the turbinated bones, but no discharge. Later there appeared a swelling just above the inner canthus, which slowly increased in size. About two weeks before I saw him there began to be some signs of local inflammation. The tumor over the canthus grew larger, the orbital tissue became inflamed—the eye was pushed towards the temporal side and forwards, and the pain became severe. When I saw him, the exophthalmos was forwards and outwards, and there was no mobility upwards or inwards. The lids were swollen, especially the upper lid, and somewhat congested. There was a tumor in the supero-nasal angle of the orbit, extending far backwards, as well as forwards and outwards. This was of bony hardness anteriorly and downwards, but seemed to simulate fluctuation backwards. It was excessively sensitive to pressure. Except for the obscure sense of fluctuation at the back of the tumor, I should have made a diagnosis of osteoma.

The boy was taken into the hospital for observation, and that night the temperature rose to $103\frac{1}{5}^{\circ}$, and he fell into a stupor, from which, however, he could be aroused.

On March 13, 1908, a deep incision was made through the upper lid, just beneath the orbital arch, beginning near the inner third of the eye-brow and carried to the glabella, at the middle of the bridge of the nose. This was followed by the discharge of a large amount of pus, and the posterior part of the tumor collapsed. After free irrigation, a stout probe was introduced and found bone erosion in every direction. The probe passed freely into the superior nasal meatus and backwards into the ethmoid cells. A large part of the orbital plate of the ethmoid was gone. The ethmoid cavity and nasal meatus were then thoroughly curetted, and many fragments of bone removed. The opening into the nose was enlarged and free irrigation from the orbit into the nose was established.

Further examination showed that what gave the impression anteriorly of an osteoma was a dense ridge of bone extending from the nasal process of the frontal bone and the nasal bone itself, forwards, outwards and downwards. There was no opening into the frontal sinus.

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The pus and detritus were crowded with pneumococci and streptococci.

The patient's temperature fell that evening to 101°, and the next morning was 99 1/5°. The symptoms of orbital cellulitis subsided rapidly, but the purulent discharge continued to be profuse for nearly two weeks, in spite of free irrigation, loose packing with iodoform gauze, and a drainage tube through the nose, and it was not until May 10th that the patient could be discharged.

CASE IV.—*Infection of Nasal Meatus, Ethmoid and Orbit.*

Rose S., a girl baby, aged 9 months, first seen March 20th, 1908. Child vigorous and well nourished. Mother stated that a swelling appeared just above the left eye two days before. This swelling rapidly extended, and when I saw the child, both lids were greatly swollen and completely closed, and could not be opened. The subcutaneous infiltration extended upon the forehead and outwards upon the temple. Pressure through the upper lid elicited nothing, as the tissues were hard and resisting. Pressure below the eye through the lower lid seemed to indicate the presence of pus. The temperature was 99 4/5°, and the pulse was 90. A long deep incision was made through the base of the lower lid directly into the orbit below the eyeball, hugging the floor of the orbit. The knife was then withdrawn, and a bistoury with guarded point was then introduced, and the free incision carried back to the apex of the orbit. There was immediately discharged about half an ounce of pus, mingled with shreds of broken-down connective tissue and small fragments of bone. This pus and the shreds of tissue were carefully examined and found crowded with pneumococci and streptococci. After careful irrigation, a probe was introduced, and roughened bone was felt on the floor of the orbit as far as the apex, on the nasal wall, and on the roof of the orbit near the superior bony margin, over which the periosteum was necrosed and cast off. There was an irregular ragged opening into the superior nasal meatus. The ethmoid and nasal meatus were carefully curetted, and all fragments of bone removed. Irrigation from the orbit into the nasal meatus was carried out, as the fluid passed out through the nose. The wound was then loosely packed with gauze and the parts bandaged. The operation was followed

by a rapid rise in temperature to $104\frac{4}{5}^{\circ}$, and that night there were symptoms of meningeal irritation, the head being retracted and accompanied by convulsive movements of the right side.

The gauze was removed the next morning and free irrigation brought away fresh masses of necrotic tissue and a thin sero-purulent discharge. This irrigation and repacking were done twice a day. On March 22d the temperature rose to $105\frac{3}{5}^{\circ}$, but sank the next morning to $101\frac{1}{5}^{\circ}$ and rose in the evening to $102\frac{4}{5}^{\circ}$.

The next morning, March 24th, it sank to $100\frac{1}{5}^{\circ}$, but that evening rose to $104\frac{4}{5}^{\circ}$. It was then noticed that there was a swelling at the outer canthus, which extended to the upper lid, and the cornea was ulcerated near the lower margin. The swelling was freely incised and a quantity of pus removed from the outer angle of the upper lid. The temperature again sank to $101\frac{3}{5}^{\circ}$, only to rise again to $103\frac{4}{5}^{\circ}$. The orbit was again thoroughly irrigated and more necrotic tissue removed. The temperature sank to 100° the next morning, March 26th, rose to 101° that evening and again sank on March 27th to $99\frac{4}{5}^{\circ}$.

The swelling of the surrounding parts gradually subsided. On March 28th the temperature rose to $103\frac{4}{5}^{\circ}$, and then gradually sank on March 31st to 100° . On April 1st it rose to $102\frac{2}{5}^{\circ}$, and on April 2d to $103\frac{2}{5}^{\circ}$. It then sank to 100° on April 3d, but again rose to $102\frac{2}{5}^{\circ}$. Careful search was made for some other septic focus, but nothing was discovered until April 8th, when the temperature suddenly rose from $98\frac{4}{5}^{\circ}$ to $104\frac{2}{5}^{\circ}$, and this was followed by a discharge of pus from the left ear. Then, after irrigation of the canal, the temperature fell to 101° .

On April 9th a free myringotomy of the left membrana tympani was done and the temperature fell to $99\frac{2}{5}^{\circ}$. There was a free discharge from the ear, assisted by irrigation, until April 15th, when it ceased. From this time all the symptoms rapidly subsided, and on April 18th the temperature fell to the normal and remained there. The corneal ulcer gradually healed and the surrounding zone of infiltration disappeared.

This case was one of great gravity, and for many days the result was exceedingly doubtful. The temperature was essentially a septic one, ranging as high as $105\frac{4}{5}^{\circ}$, and chang-

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ing rapidly from high to low. The pulse rate varied between 89 and 176, and the respiration from 24 to 62 per minute.

The case ended in complete recovery, with a clear cornea, and a slight eversion of the lower lid from contraction of the cicatrix of the incision. The patient was discharged on May 4th.

Another notable point in this case was the extreme youth, the patient being only nine months old.

CASE V.—*Pneumococcus and Streptococcus Infection of the Orbit, Lacrimal Gland and Eyelids.*

N. F., boy, aged 2 years. Mother noticed a protrusion of eyeball and swelling of eyelids two days before I saw him. First inspection on March 23, 1908, showed enormous swelling of both lids of left eye, marked protrusion of eyeball directly forwards, and a prolapse of the lacrimal gland between the closed lids. There was great chemosis of the conjunctiva and a cloudy cornea without ulceration. The eyeball was immovable. Temperature $103\frac{4}{5}^{\circ}$ and pulse 160 to the minute. Child cries constantly and is very restless. Eyelids could not be separated. No conjunctival discharge. Under chloroform anesthesia, a free canthotomy was done and the external canthal ligament completely divided. The orbital cellular tissue was then incised on the nasal and temporal sides, and above and below the eyeball, the knife being introduced far back in the orbit. These incisions were followed by a large flow of pus, which was collected and kept for examination. The lacrimal gland was then incised, and a large amount of pus followed. After continued irrigation of the cavity of the gland by a bichloride of mercury solution, the same was done with the same solution. Exploration was then made of the orbital plate of the ethmoid bone, and a small area of necrosed bone was found. A large free opening was made in the orbital tissue and

nose, the incisions were stuffed loosely with fine iodoform gauze.

The child rallied well from the operation, and that evening the temperature went down to $99\frac{3}{5}^{\circ}$. There was a daily rise of temperature to 103° for six days, but free irrigation followed by loose packing with gauze invariably caused a fall in the temperature. For two days the child was delirious, but after the third day the delirium did not return. The orbital infiltration rapidly subsided, and at the end of a week the mobility of the eye was restored. The anesthesia of the cornea disappeared, there was no loss of substance, and the cornea cleared up entirely at the end of three weeks. The infiltration of the lids lasted longer and was not entirely gone at the end of five weeks, when the patient was discharged.

CASE VI.—*Pneumococcus and Streptococcus Infection of Nasal Meatus, Ethmoid Cells, Frontal Sinus, Orbit and Tympanic Cavity.* (Private Patient).

J. L., a young man, aged 23, first seen March 8th, 1908. For a month or more he had some obstruction in the nose and could not breathe through the right nostril. Three days before I saw him, he complained of deep-seated pain in right orbit and over right eye. The next morning the eyelids were swollen and the eye protruded.

When I saw him on the third day the exophthalmos was marked, the eyeball immovable, and the eyelids were enormously swollen, the swelling extending upwards to the forehead, outwards to the temple and downwards upon the cheek. The temperature was $103\frac{4}{5}^{\circ}$, he complained of severe pain, and the parts were very sensitive. Under general anesthesia a deep incision was made into the orbital tissue on both sides of the eyeball, the knife being passed far back into the orbit. The hemorrhage was abundant, but no pus was found. The wounds were freely irrigated and were packed with gauze. The next day there was no pus, and all the symptoms were worse. A long incision was then made through the upper lid, just below the orbital margin, involving about four-fifths of the length of the lid, the incision passing through the tarso-orbital fascia, and extending far back in the orbit. This was followed by the exit of a large amount of pus. A probe passed

directly into the nasal meatus, and also into the right frontal sinus. After careful irrigation, which brought away fragments of bone and pieces of broken-down tissue, a more extended examination showed that nearly the entire orbital plate of the ethmoid was gone, and roughened bone on the roof and floor of the orbit. The septum between the frontal sinuses was broken down, and both sinuses were full of pus and fragments of bone. The opening into the left frontal sinus was enlarged, and both sinuses were thoroughly curetted and then freely irrigated until all detritus was removed.

The opening into the nasal meatus from the orbit was enlarged and the meatus curetted and irrigated, and a drainage tube inserted. The cavity of the ethmoid was thoroughly curetted and irrigated, and the wound was then packed with gauze. That evening the temperature fell to $100\frac{1}{5}^{\circ}$ and the severe pain disappeared.

The next morning the symptoms had markedly subsided, but that afternoon the temperature rose to $103\frac{2}{5}^{\circ}$ and he complained of severe pain in the right ear. Inspection showed a bulging reddened tympanic membrane, but no tenderness over the mastoid. The membrane was at once incised and a small quantity of pus came out, which on examination was found filled with pneumococci and streptococci. The tympanic cavity was carefully irrigated and the auditory canal was plugged with antiseptic cotton. The temperature again fell to 100° and did not rise above this point for three days. Then it rose rapidly to $104\frac{4}{5}^{\circ}$ and the infiltration of the orbit increased. The dressings were removed and the orbital cavity, frontal sinuses, ethmoid and nasal meatus thoroughly irrigated, but brought no great flow of pus. The aural symptoms had entirely subsided and there was scarcely any discharge from the ear. A careful examination was then made of the orbit, and far back at the apex the knife opened another abscess, from which there was a free discharge of pus. The pus on all occasions was found loaded with pneumococci and streptococci. From this moment the symptoms rapidly subsided. A spot of infiltration and ulceration had appeared in the cornea near the lower margin, which had threatened to perforate, but after the evacuation of the deep abscess, the orbital cellulitis subsided, and the corneal complications began to heal, and eventually the cornea cleared up entirely. The course of the disease lasted nearly three weeks, during which the tem-

perature varied between 100° and $104\frac{4}{5}^{\circ}$. At times the patient was delirious, and at other times somnolent and in a stupor, which was alarming. He was discharged from treatment at the end of the sixth week. The exophthalmos had all gone, and the eye was freely movable in the orbit. The cornea was clear, the membrana tympani was healed, and the hearing was only moderately impaired.

There is some ptosis, but not so much as might have been expected from the extensive incision, and this can be improved by subsequent operation.

47 W. 36th Street.

OCULAR AFFECTIONS ASSOCIATED WITH DISEASE OF THE SINUSES CONTIGUOUS TO THE ORBIT.*

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A most important advance in our understanding of the etiology and nature of a considerable group of obscure ocular affections has been set forth, during recent years, in a rapidly growing literature covering the border lines between ophthalmology and rhinology. It is not my purpose in this paper, nor is it necessary before this society, to review this literature, but rather to present briefly the histories of a few cases selected from my own experience which will furnish additional evidence, and serve to emphasize the very frequent relation of cause and effect existing between various forms of eye diseases and affections of the bony sinuses in the anterior segment of the skull, contiguous to the orbits and accessory to the nasal fossae. A full appreciation of the frequency and importance of migratory inflammations from the nasal chambers and their cavities to the orbital contents was doubtless delayed by the neglect upon the part of the ophthalmologist to keep in mind the contiguity of these mucous-lined cavities and their intimate anatomical connections with the orbits.

It is true that we have not been unmindful of the fact that disease of the ethmoidal cells was the *fons et origo* of orbital abscess; that *malignant disease* of the maxillary sinus or of the ethmoidal cells was especially prone to invade the orbit, but I am convinced that, so far as the literature affords an indication, we have not appraised at its full value the responsible part played by affections of these cavities in the production of ocular discomfort and ocular disease. Those who have had any extended experience in the treatment of the upper air passages know how difficult it is to secure surgical cleanliness in the nasal fossae.

*Read before the American Ophthalmological Society, New London, Conn., July 15, 1908.

It should be remembered that the mucous membrane lining the interior of the nose is continuous through narrow drainage canals with the lining "*muco-periosteum*" of all the accessory sinuses. These sinuses are likely, therefore, not only to participate in the infectious diseases of the nasal membrane, but, by their anatomical situation, and by turgescence of the nasal membranes, are removed from any favorable opportunity for natural protection by the usual methods of increased secretion and free drainage. The intimate anatomical connection of the inflamed membrane lining the thin bony walls of these cavities; the frequent lapses in the bony continuity of their walls; the network of sutures which in adult life unite the different centers of ossification; the numerous foramina for the passage of nerves, arteries, veins and lymph channels, all give opportunity for the migration of infectious products to contiguous tissues.

Since the walls of these sinuses form so large a part of the walls of the orbit, reasoning *a priori*, it is not cause for surprise that the contents of the orbit are liable to invasion, as has been so abundantly proven by comparatively recently published observations and clinical reports. It is, however, a cause for surprise that the frequency of its occurrence, and its serious significance in ocular affections was not sooner, and certainly more generally recognized.

More or less serious an obscure ocular disease has, I am sure, in some instances been ascribed erroneously to more remote causes; or a rebellious asthenopia, which would not be vanquished by the correction of an error of refraction or some muscular imbalance, has been laid at the door of neurasthenia, toxemias or other causes, when the real origin of the trouble was to be found in some affection of one or more of these bony-walled cells. It may often be nothing more serious than pressure, e. g., in a frontal sinus or the anterior ethmoidal cells due to a blocking or closure of the drainage outlet by a so-called "chronic cold in the head," which, when investigated, proves to be due to a turgescence or a chronic hypertrophy of the nasal mucous membrane in the middle fossae, of the nasal chamber, or to some mild chronic sinusitis, probably the persisting result of some ante-dating acute infection. I have seen many examples of the truth of this suggestion. The following cases will serve to illustrate the importance of careful attention to this field of observation.

CASE I. Mr. F. had for many years been the victim of pain in the head, aggravated by using his eyes and often culminating in violent attacks of sick headache. He had a high degree of mixed astigmatism, the correction of which gave him entire relief from his violent attacks, but he was nevertheless unable to use his eyes with comfort. Repeated corrections of the error of refraction failed to either give him satisfactory use of the eyes, or to relieve him of a persistent frontal headache with which he would rise in the morning. It would be aggravated by exposure to strong light or by the persistent use of his eyes.

The symptoms therefore pointed definitely only to ocular disturbance. That the eyes were probably the sole cause of his suffering found emphasis also in a constantly congested state of the fundus oculi which presented a flannel red, fluffy appearance. A careful study of the nose at one of his visits, when he was in an especially uncomfortable state, revealed a swollen middle turbinate on both sides which completely blocked the upper nasal passages, and probably closed the ethmoidal and frontal sinuses. Cocain with adrenalin contracted the tissues, and his pain promptly subsided. A few cauterizations with tri-chloracetic acid, and careful daily cleansing of the parts with a suitable wash relieved the blocking, the pressure was removed, and his eye symptoms disappeared.

A point which should be borne in mind in the class of affections under consideration is the abnormal anatomical relations which, not infrequently, either lie at the foundation of the sinus disease, or afford especial liability. The importance of this statement was strongly illustrated in the case just reported. He had an abnormally shaped skull, affecting especially its anterior segment. One side of the face was smaller than the other, the zygoma being flat on the small side, rounded and bulging on the other, while the pupil on the flat side was much nearer the median line than the left.

This distortion of the skull modified the form of the orbits, and the relation of parts in both nostrils, and doubtless, also the size and location of the ethmoidal and other sinuses. The middle turbinate on the right side was forced backward and tightly wedged between the deflected septum and the orbital wall, so that the breathing space was limited, and still further blocked by the hypertrophied and boggy soft tissues which effectually prevented all normal drainage from the ethmoidal cells. In addition to these unfortunate congenital anatomical

defects, the eye balls having developed in the abnormally shaped orbits, were highly astigmatic, i. e., misshapen, the corneal curvature being ellipsoidal instead of a rotated sphere.

There can be no question but that this man's liability to disease, both in the nostrils and accessory sinuses, and also the astigmatic eye balls with asymmetrical meridians were all due to the congenital malformation of the anterior segment of the skull.

Many clinical examples could be brought forward to demonstrate the importance of these congenital defects in causing both ocular and rhinologic disturbance. That affections of the nose are important is emphasized by the well-known weakness of the eyes during an acute coryza even when these abnormal anatomical states are not present. The increased lacrimation, photophobia, and inability to use the eyes in the presence of a so-called cold in the head is a common experience.

It is not unreasonable to anticipate that any prolonged turpidity of the uveal tract, caused and maintained by the conditions which have been described, must in many cases lead to more serious sequellae through disturbance of the ocular nutrition.

CASE II. P. S., age 42, a gardener in the employ of one of my personal friends, was sent to me for failing vision and constant frontal headache. He had made the round of various clinics without relief. His vision was reduced to 1/5. Both lenses were swollen and opalescent, and the vitreous was filled with floating opacities. Under the persistent use of atropia and dionin with the iodides internally, he secured partial relief, but had many relapses into attacks of violent headache. A careful study of the nostrils and frontal sinuses was then made. Transillumination revealed a blocking of both frontal sinuses, and both middle turbinates were found wedged against the bony septum. The amputation of the middle turbinates was followed by a profuse discharge of pus, and almost instant relief from the headache and undue sensibility to light. There was, however, a tendency to recurrence of accumulation in the sinuses, and return of pain, probably due to a blocking of the ethmoidal as well as the frontal sinuses.

The man declined any radical procedure for securing freer and permanent drainage, and sought other advice. The relief from both the pain and ocular symptoms following the ampu-

tation of the middle turbinates, and the temporary drainage of the sinuses, leaves but little room for doubt as to the responsibility of the sinus disease for the affection of the eyes.

In the periodical literature, much stress has been laid upon optic nerve affections secondary to disease of the sinuses, but the preceding cases have been presented to show that the origin of affections in the *uveal tract* will often be found in inflammation of one or more of these bony cavities. In June, 1904, I presented a paper on the subject to the section on specialties of the Pennsylvania State Medical Society, in which the history of two such cases were narrated.

The first was a case of acute purulent inflammation at the root of a molar tooth, with the extension of disease to the maxillary antrum followed by a general uveitis which resulted in blindness, and sympathetic irritation of the fellow eye. The ball was enucleated, and found firmly adherent throughout its lower half by the products of inflammation.

The second was a case of chronic inflammation of the sphenoidal and ethmoidal sinuses with secondary uveitis and blindness of the right eye.

I now present case III of this paper, in which events seem to have succeeded each other in the following order:

Firm blocking of the right upper nasal fossa by hypertrophy of the middle turbinate; purulent inflammation of the right frontal sinus; filtration into right maxillary antrum, necrosis and destruction of the floor of the frontal sinus; abscess of the orbit; proptosis of the eye ball; optic neuritis with reduction of vision to 1/5 Recovery through surgical procedure.

Mr. M., age 47, consulted me August 5, 1903, for confusion of sight due to diplopia, and right hemicrania, which radiated from the mid-frontal region to the right ear and occiput. There was slight puffiness of the right upper eye lid, the ball was proptosed forward, downward and outward, but the field of forced fixation was but little disturbed, except upward where it was limited to the horizontal line. Deep palpation under the orbital rim revealed only a soft fullness, leaving the impression of displaced orbital fat, but no nodular masses were discoverable. The movements of the left eye were normal, and both pupils reacted normally to light and shade. The fields of vision were not impaired, there was no scotoma. V. = 6/7-1/2 in each eye. There was a low grade of

hypermetropic astigmatism in each. In the position of rest the proptosed ball was estimated as 1 cm. in front of its fellow, and the center of the pupil 8 mm. lower. On everting the upper lid, the retrotarsal fold came forward, and there was moderate chemosis of the conjunctiva. Firm pressure upon the ball through the closed lids reduced the exophthalmos, increased the periorbital pain, and caused a painful sense of fullness or pressure in the right nostril. The ophthalmoscope showed no change in the calibre of the blood vessels, but the disk was grayish-red, opaque, and its margins obscured, while the entire fundus was a fluffy, homogeneous dark red color. A study of the nostrils showed the left nearly normal, but the right was stuffed with polypoid masses, which bled freely. A portion of this tissue was removed, sent for examination, and reported as malignant, but a second examination did not confirm this opinion. Transillumination showed that both the frontal sinus and the maxillary antrum on the right side were blocked by opaque contents.

After consultation with Dr. G. E. de Schweinitz and Dr. B. A. Randall, it was decided to attempt the drainage of the frontal sinus and antrum through the nostril before adopting a more radical procedure. At my request Dr. Randall amputated the middle turbinate and enlarged the opening into the maxillary antrum. A canula was then introduced into each sinus daily, and large quantities, at first of semi-inspissated pus washed into the nostril. The proptosis of the eyeball was greatly diminished by this procedure, and the pain became less severe, but both the pain and prominence of the ball recurred after any neglect of the troublesome and painful irrigation. After several weeks, vision sank to $\frac{1}{5}$ in the right eye, the optic nerve margins were entirely obscured, the veins were full, dark and tortuous and the summit could be seen with +4 D.

He was then admitted to the Polyclinic Hospital, and assisted by Dr. Randall the frontal sinus and anterior ethmoidal cells were freely opened through an incision under the orbital rim extending from a point under the middle of the eye brow inward to the nasal bone, and downward along its border. On attempting to separate the periosteum the floor of the frontal sinus was found necrosed, and was curetted away.

There was a profuse gush of foul, glairy, purulent contents which was found to fill not only the entire sinus, but the orbit back of the eye ball. The cavity after a painstaking removal of the diseased bone and granulation tissue, was carefully and thoroughly cleansed by irrigation with bichlorid solution and diluted peroxid of hydrogen, followed by warm physiologic salt solution. A drainage tube was inserted into the frontal sinus, and a second into the nostril from the inner angle of the incision, and the wound closed.

The pain and proptosis promptly disappeared, and convalescence progressed uninterruptedly. The neuritis slowly subsided and vision rose to normal. Notwithstanding the displacement of the trochlear attachment of the superior oblique during the operation, normal binocular balance was restored.

In November, 1906, there had been no relapse. Vision with correcting glass was 6/5 in each eye, and there were no remaining signs of the optic neuritis. There was orthophoria. There was no visible scar remaining from the operation except at the point of emergence of the drainage tubes, and as this was under the nasal end of the brow, could be seen only when the head was tilted backward. This result emphasizes an important point in the technique of the operation for opening the frontal sinus. The incision under the orbital rim gives equal if not readier access to the sinus, secures more favorable drainage, and does not result in the deforming scar so often seen when the operation has been made above the rim of the orbit.

That serious optic neuritis associated with a symptom complex suggesting intracranial disease may find its origin in an unsuspected sinusitis is demonstrated by the history of the following case:

CASE V. *Optic Neuritis; impaired central vision, contracted fields; recovery after drainage of frontal and ethmoidal sinuses after duration of nearly three years.*

Thos. C., age 40, was sent to my clinic at the Wills Hospital, May 26, 1905, by his physician, Dr. Fetterolf. He had been suffering from insomnia and faulty vision, with frequent exacerbations of greatly increased but transient impairment of sight. At his first visit V.=6/10 in the right eye and 6/6 in the left. The ophthalmoscope showed H.=2 D. at the fovea in each eye, but the papillae were swollen, and the margins of the disks hidden by the infiltrated overlying tissues.

There were numerous flame shaped hemorrhages on each nerve and throughout the fundus. The summit of the nerve was + 6 in the right eye, and + 4 in the left.

The fields of vision were concentrically contracted to approximately 40°, but no scotoma could be demonstrated. The urine was normal. The man's mother had diabetes, but otherwise the family history was good. He had never had gonorrhea or syphilis. The patient was sent to Dr. Weisenberg, then consulting neurologist to the hospital, for consultation. After an elaborate and painstaking study, Dr. Weisenberg reported the neurologic examination as negative with the exception of a general increase in the tendon reflexes. There was "entire absence of focal symptoms, and of general pressure phenomena," but nevertheless he advised that the skull should be trephined because of the great swelling of the optic nerves, and for the reason that "a new growth might be present in the cranial cavity in a region such as would not give any definite focal symptoms."

The man would not consent to this, and the operation was not strongly urged. Even though there was no cause to suspect specific infection, large doses of potassium iodide, mixed treatment and mercurial inunctions to the point of commencing ptialism were at different times persistently employed for many months with varying results. For a series of weeks the subjective symptoms would subside, the retinal hemorrhages absorb, and the swelling of the papillae diminish, and a partial, or at times a nearly complete restoration of the fields of vision, so that on several occasions the man returned to his employment, the care of a stationary engine, only to suffer a recrudescence of the entire symptom complex. He had from the first complained of difficulty in breathing, especially at night, but on March 9, 1907, after a particularly bad and sleepless night, he came to my private office complaining of frontal pain. I then found a fresh crop of hemorrhages in the retina, and observed his great difficulty in breathing. I then examined the nostrils and found both middle turbinates hypertrophied, and polypoid masses filling tightly the upper nasal space on both sides. The stuffing of the upper nasal fossae was so complete as to effectually prevent all drainage from the accessory sinuses. I then amputated the middle turbinate on the right side, and two weeks later the same operation was performed on the left nostril. This was nearly two

years after his first visit to the clinic, during which time he had been constantly under observation and treatment by his physicians, Dr. Fetterolf, Dr. Weisenberg and myself or my assistants.

The relief which followed these operations was phenomenal. The drainage from the frontal and ethmoidal cells was free, and at first profuse, consisting of a creamy white discharge. Irrigation was not adopted as it seemed unnecessary. The distress in the frontal region disappeared and he slept well. Vision rose to 6/6 in each eye, and on April 20, one month after the operation, the fields of vision were normal, and have remained so to date of writing, April 20, 1908. The swelling of the papillae have slowly diminished, notwithstanding his continuous occupation at his engine. In the right eye the nerve can still be seen with + 1 D. through the correcting glass, but in the left the swelling has disappeared. The nerve margins can be seen indistinctly through the long time infiltrated overlying tissue. There has been no return of the hemorrhages. I can now but feel that the long delay, two years, before a study of sinus conditions was made, is a just cause for self reproach.

1728 Chestnut Street.

DIFFUSE INTERSTITIAL KERATITIS IN ACQUIRED SYPHILIS.*

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Interstitial keratitis, due to *acquired syphilis*, is probably not sufficiently rare to justify the further reports of mere clinical histories; but, in my opinion, the subject is one worthy of interest, and a careful review of the facts should prove timely.

That the cornea may become involved in acquired syphilis, can no longer be denied, inasmuch as at least one hundred well authenticated cases have been recorded, in which, as a late secondary or tertiary symptom, diffuse interstitial keratitis appeared in patients suffering from syphilitic infection. Indeed, the rarity of its occurrence may be more apparent than real, for as Valude and Stevenson have remarked, we are apt to overlook the possibility of acquired syphilis in young patients, and thus fail to search for evidence of infection from syphilitic nurses, or from one of the many sources in which the disease may be innocently acquired. Moreover, cases mentioned in discussion have never been formally recorded, and Davis, in a paper read before the Ophthalmic Section of the American Medical Association, June, 1908, called attention to the paucity of reports in American, as contrasted with Continental and English ophthalmic literature.

It is uncertain to whom belongs the credit of first recognizing the relation between acquired syphilis and interstitial keratitis, but Verhaege (*Gazette des Hopitaux*, Oct. 15, 1904) states that although Velpeau (*Maladies des Yeux*, 1840) refers to the action of syphilis in producing keratitis, Follin (*Pathologie Externe*, 1861, p. 708) was the first writer to point out that the cornea might suffer in *acquired syphilis*. It is certain, however, that in 1873 Jakowlewa (*Zurich Thesis*) published fifty-one cases of interstitial keratitis, of which two were clearly due to acquired syphilis. In the same year, Four-

*Read before the American Ophthalmological Society, New London, Conn., July 15, 1908.

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nier (*Lecons sur la syphilis chez la femme*) cited cases having a similar origin.

Some interesting statistics have been collected illustrating the relative frequency of acquired as compared with inherited keratitis. Verhaege thinks that from 2% to 3% of all cases of interstitial keratitis are due to acquired syphilis. Haltenhoff only finds it five times in seventy-two cases. Stevenson's figures show that 1.9% to 10% of all cases of the disease may be credited to acquired syphilis.* Alexander, in fifty thousand

Name.	Reference.	No. of Cases.	Due to Acquired Lues.	Percentage.
Jakowlewa...	Zurich Thesis, 1873.	63	2	3.1
Dier.....	Zeitschr. f. Augenhellk. May, June, 1889	1.9
Haltenhoff...	Bull. et Mem. de la Soc. franc. d'ophtal., 1887.....	66	5	7.5
Pfister.....	Klin. Monats. f. Augen., 1890, p. 114	130	..	3.8
Anke.....	Centralbl. f. prak. Augen., 1885, p. 360	100	10	10.0

patients suffering from various eye diseases, found it thirteen times. In about seven thousand patients from my private case records I have met with interstitial keratitis of this variety but twice, while in the Eye Dispensary of the University Hospital among twelve thousand patients we were able to find one case of interstitial keratitis in acquired syphilis. I am indebted to the courtesy of Dr. George E. de Schweinitz for permission to include the notes of this additional case.

French, German and English journals contain almost all the records of the cases thus far reported. Trousseau mentions eleven cases; Valude quotes about forty; Wandel reviews forty-five; and, at various times, in English ophthalmic literature we find reports by Morton, Wordsworth, Lang, Juler, Lawford, Critchett, Stevenson, Treacher Collins, Fisher and others.

With the exception of Wilder's paper (*Journal A. M. A.*, Dec. 21, 1901) and a few instances such as Ellett's, Marlow's and Hildrup's, American literature is almost silent in regard to this complication of acquired syphilis. Davis, in his paper (loc. cit.) containing the histories of two additional patients, states that in the *Transactions of the American Ophthalmological Society* he has not been able to find the record of a single case, and I venture to express the hope that this communication may stimulate others in this Society to record in our Transactions their personal experience in this rare condition, and thus establish the truth as to the frequency of interstitial keratitis in acquired syphilis.

CHARACTERISTICS OF THIS FORM OF DIFFUSE INTERSTITIAL KERATITIS.

I. Symptomatology.

Briefly outlined, this disease presents the following distinctive features. With an onset insidious in character, and, without marked ciliary injection, the cornea is found to contain many irregularly outlined, gray, deeply-placed, punctate lesions beginning either in its central portion, or, more rarely in its periphery. These punctate lesions gradually fuse, and the cornea becomes opaque without decided involvement of its surface, or of Descemet's membrane. Following the infiltration, vessels push from the periphery into the parenchyma of the cornea, but the vascularity is usually less pronounced than in the well-known "salmon patch" described by Hutchinson, in consequence of which, lacrimation and photophobia are not prominent symptoms. The cornea, after a short time, begins to clear; and usually, without marked signs of involvement of the uveal tract, returns to almost normal transparency, resulting in a more or less complete cure in from five weeks to three months.

Trousseau believes that the more protracted course and more serious nature of the inherited form is due to the lesser resisting power of the tissues in childhood and adolescence. In support of this he cites the history of a boy aged eight years, infected by his nurse, in whom the keratitis assumed the severe character usually seen only in inherited syphilis.

A second form of diffuse interstitial keratitis, seen less frequently than the foregoing, is characterized by a peripheral opacity usually situated on the upper part of the cornea, and

more or less triangular in shape, accompanied invariably by a severe plastic iritis. More circumscribed in extent, it has been called *Partial Interstitial Keratitis* by Alexander. The opacity in this variety becomes dense,—“ground-glass” cornea—and the “salmon patch” may be pronounced; the iritis, which invariably accompanies it being its distinguishing feature. Hoch, Demarbaix and Sturgis have published cases, while Alexander and Nagel ascribe it to a trophic disturbance, produced by degenerative neuritis of the ciliary nerves, caused by inflammation of the iris and ciliary body.

Unilaterality—Contrary to the rule in the inherited form, the interstitial keratitis of acquired syphilis almost invariably attacks but one eye. According to Verhaege (loc. cit.), in about 70% of the cases one eye was attacked. It has been suggested that the unilaterality of the affection, as well as its milder character, is due to the prompt curative action of mercury.

Period of Onset—The length of time between the initial lesion and the appearance of this corneal complication varies within wide limits, from three weeks in Loewensohn's unique case, to twenty-three years in Ellett's. Verhaege says 36% occurred in the second year, and according to Stevenson 10.8 years is the average period in the cases collected by him, while but few cases have been reported as occurring under two years, three only within one year.

Complications—Iritis, involvement of the anterior portion of the uveal tract, indicated by vitreous opacities and inflammatory foci well forward in the chorioid, often accompany the interstitial keratitis of acquired syphilis; but, if we except the rare form, known as partial interstitial keratitis, in which iritis is the invariable rule, these complications are far less frequent than in the inherited type of keratitis.

As an unusual complication may be mentioned corneal ulceration (Treacher Collins), and a few instances of destructive inflammation of the eyeball—panophthalmitis or resulting staphyloma.

Associated Symptoms—Inasmuch as this corneal complication is usually found in the tertiary stage of syphilis, oronasal ulcerations, palmar and plantar psoriasis, gummata of the skin, periosteum and muscles, ozena, facial paralysis, vitreous opacities and chorio-retinitis have been noted as associated lesions.

II. Pathology.

Naturally but few eyes affected with true interstitial keratitis have been examined microscopically, and I have found no record of such examination in keratitis of acquired syphilis. Fuchs' description of the pathologic anatomy of interstitial keratitis is as follows: Dense infiltration of the most posterior layers of the cornea, so that they sometimes appear as if transformed into granulation tissue; numerous newly formed blood-vessels in the posterior and middle layers. The infiltration at the margin of the cornea is continued into the ligamentum pectinatum, the iris, and the ciliary body. Nodular aggregations of lymphocytes were also found with accumulations of leucocytes upon Descemet's membrane. That changes occur in the endothelium in interstitial keratitis is rendered probable by E. v. Hippel's fluorescein experiments, since deep staining frequently occurs in these cases. (*Parsons' Pathology*, Vol. I.)

Leber, Nuel, Stevenson and others regard interstitial keratitis as invariably secondary, following uveitis; but J. Herbert Fisher (*Trans. Oph. Soc. United Kingdom*, Nov., 1907) thinks that this is by no means universally accepted.

In *v. Graefe's Archiv für Ophthalmologie*, 1906, Elschnig reviews at length the literature of the Pathology of Parenchymatous Keratitis. His microscopic study of the corneal lesions was made at the earliest stage yet reported upon. He finds it absolutely sure that the corneal alteration is primary, and that the earliest change is an excessive proliferation of the fixed corneal corpuscles (and also of the wandering cells), which then swell and degenerate. Just in front of Descemet's membrane were masses of proliferated corneal corpuscles, with a few round cells, and many giant cells, and structures resembling giant cells, but no epithelioid cells. Stains for bacilli were negative. The widened lymph spaces of the cornea were filled with a granular detritus, and the lamellae between them were in places necrotic and infiltrated with round cells. There was widespread vascularization, and many of the arteries of the uvea showed proliferation of the intima, with obliteration and thickening of the degenerated walls. (*Oph. Year Book*, 1906.)

III. Etiology.

Interstitial keratitis in acquired syphilis is a disease of adult life, occurring usually between twenty and fifty. We must not forget, however, that cases occurring in childhood may be overlooked. Stevenson records the history of an infant aged four months, while Monphous and Trousseau observed it in children of one and eight years, respectively.

Parenchymatous keratitis has been experimentally produced in rabbits and monkeys by inoculating the cornea with scrapings from chancres and other lesions in the human being, and the spirochetæ pallidæ have been found in such lesions. Stevenson and others, Stock, Peters, Römer and Babb, have found spirochetæ in congenital syphilis of the eye. According to Stevenson, the cause of the keratitis is the deposit and multiplication of the spirochetæ, which come from the uveal tract.

Certain it is that the discovery of the spirochetæ by Schaudinn and Hoffman in May, 1905, and the subsequent confirmation by many observers of the importance of this organism in the production of syphilis, opens up a fruitful field in the etiologic study of syphilitic lesions in ocular tissues. Chancre of the conjunctiva followed by interstitial keratitis, as in my first case, furnishes a clinical confirmation of the importance of this agent in producing corneal inflammation. The parallel between the experimental production of parenchymatous keratitis by inoculation, and this association of keratitis with chancre in the immediate vicinity is only too obvious. In this connection, Treacher Collins (*Royal London Oph. Hos. Reports*, Vol. XVI) remarks: "The association of these two rare affections would seem to imply more than a chance coincidence. It would suggest that the proximity of the primary lesion in syphilis, to the eye predisposes it to become subsequently the seat of an interstitial keratitis. The fact that, in each case, the keratitis occurred in the eye on the side on which the chancre was situated, and, so far as the histories of the cases go, on that side only, is further in keeping with this suggestion."

There seems to be no foundation for the claim sometimes made, that interstitial keratitis in this class of patients is produced by the general dyscrasia rather than by the toxin of syphilis. Pathologic investigations refute this claim, which

is moreover not borne out by the clinical records, most patients showing a satisfactory condition of general health.

Next in etiologic importance to syphilis, is tuberculosis. The experience of Pflüger, of Bern, who reported thirty cases (*Heidelberg Cong.*, 1896) in which influenza caused interstitial keratitis, is unique. Isolated instances of interstitial keratitis have been reported in rheumatism and after the exanthems (mumps), but in these we may suspect inherited syphilis.

IV. *Differential Diagnosis.*

A most useful aid is furnished by Bull's classification (*Morrow's System of Genito-Urinary Diseases, Syphilology and Dermatology*, Vol. II, p. 550) which is as follows:

1. Diffuse parenchymatous or interstitial keratitis, which may involve either the center or the periphery of the cornea; or may assume a triangular shape, and this is always accompanied by malignant iritis.

2. The true keratitis punctata of Mauthner, or the keratitis interstitialis punctiformis specifica of Hoch, in which numerous punctate spots of infiltration appear in the parenchyma of an otherwise transparent cornea, without iritis.

3. Keratitis punctata in which the punctate deposits are accompanied by a generally cloudy cornea, and by iritis.

4. Gummatous degeneration of the cornea.

There is usually nothing in the appearance of the interstitial keratitis of acquired syphilis to distinguish it from the inherited form. Only by a thorough investigation of the family and personal history, and by a painstaking search for the distinctive lesions of hereditary syphilis, can we satisfy ourselves as to the true nature of the individual case under consideration. Without a clear history it may be impossible to distinguish tubercular from syphilitic keratitis, as the clinical features may be identical, and microscopic examination fail to differentiate between the two conditions.

V. *Prognosis.*

The prognosis regarding restoration of vision, and duration of the disease, in the acquired form, is almost invariably favorable, although Wordsworth, Alexander, Griffith and Symons have reported cases in which the disease terminated in blindness. As a rule, to which there are few exceptions, one may promise early and complete recovery—a sharp contrast, indeed, to the gloomy prognosis of inherited interstitial keratitis, which drags its weary length over long months of

apparently futile treatment, and terminates not only in corneal opacities, but, in many instances, leaves the eye seriously damaged by associated destructive lesions of the deeper portions of the uveal tract.

VI. Treatment.

Interstitial keratitis due to acquired syphilis, responds with remarkable promptitude to antisyphilitic remedies. Mercury, whether administered by inunction, intra-muscular injection or by the mouth, produces rapid subsidence of the inflammatory symptoms, apparently controls vascularization, and finally produces absorption of the corneal infiltrate in a manner quite analogous to that seen in the melting away of a so-called gumma of the iris. Large doses of potassium iodide do not seem to act as beneficially, and in my first case appeared to aggravate the condition. The local treatment does not differ from that of ordinary interstitial keratitis; atropin, dionin and measures to secure rest of the inflamed organ, should be followed by massage with the ointment of the yellow oxide of mercury. The average duration of the disease—five weeks to three months—illustrates the powerful curative influence that mercury possesses in these cases.

CLINICAL NOTES.

The clinical notes of my patients are as follows:

CASE I. A. P., male, aged 27, suffered from a chancre of left lower lid involving conjunctival surface at inner canthus, first noticed about June 1, 1905. The diagnosis, abscess of the lacrimal sac, made by another physician, was followed by free incisions, and at the time of his first visit, July 19, 1905, there was intense swelling which closed the lids; but, near the inner canthus, a broad ulcerated area with sharply outlined edge, was discovered just within the lid margin. The surrounding induration, together with glandular involvement of the neighboring lymphatics, led to a careful examination for other evidences of syphilis. Faint copper-colored spots were found on the arms and thorax. The appearance of the eye at this time is shown by water-color sketch No. 1.

The diagnosis of chancre of the lid was made and vigorous mercurial treatment instituted. Well-marked secondaries followed and in about four and one-half to five months after the initial lesion, the onset of mild symptoms of ciliary injection, photophobia and lachrimation, led to a careful examination of

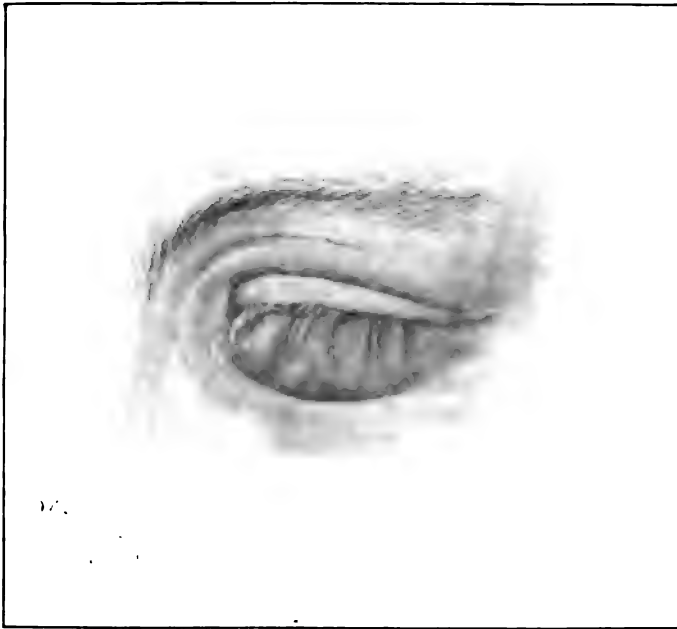


FIG. 1.—Chancre of lower lid involving conjunctiva at inner canthus.

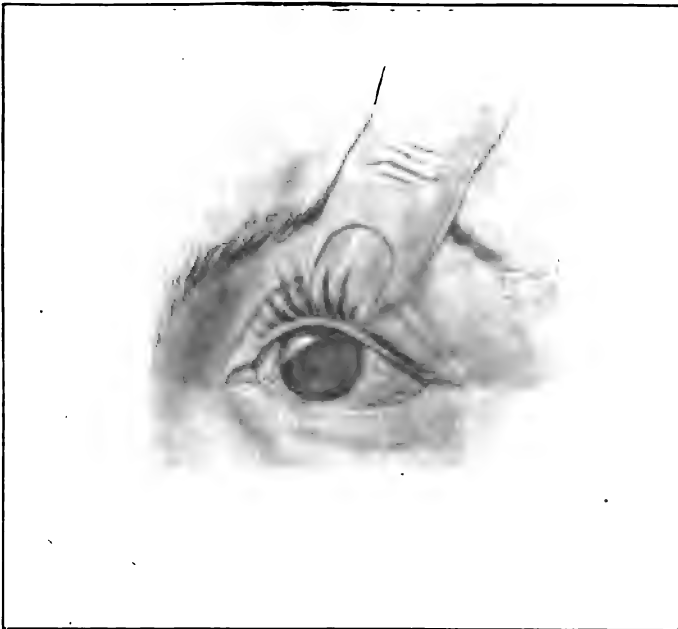


FIG. 2.—Same case six months later, showing interstitial keratitis.

the cornea. Beginning at the lower corneal periphery, a number of gray, deeply placed areas were seen, which gradually became more numerous, fused, and in a few weeks, typical diffuse interstitial keratitis developed. In addition to the general opacity of the deeper layers, the cornea showed radiating fan-shaped streaks proceeding from the inflammatory focus first discovered near the lower border of the cornea. Steady progress of the opacity slowly obscured the entire cornea, and a well defined "salmon patch" developed—vision being reduced to counting of fingers. The conditions January 17, 1906, are faithfully reproduced in the water-color sketch No. 2, by Louis Schmidt.

Under active mercurial treatment the cornea slowly cleared, the vascularization disappeared and ultimate visual acuity $6/7\frac{1}{2}$ was gained. Although the severity of the keratitis was quite as intense as in an average attack of inherited interstitial keratitis, the cornea cleared completely except for the remnants of new vessels which had pushed in from the periphery of the cornea. The "salmon patch" in this case, while quite typical, remained limited to the lower half of the cornea.

Remarks.

It is interesting to note in connection with chancre of the conjunctiva followed by interstitial keratitis, that this association has been found no less than ten times in literature. The following table shows the name of the reporter, sex of patient, and the time of development of the keratitis after the appearance of the chancre. I have called attention earlier in this communication to the fact that the presence of a chancre in the vicinity of the eye seems to predispose that eye to an attack of interstitial keratitis—a fact commented upon by both Lang and Treacher Collins.

CHANCRE OF THE CONJUNCTIVA OR EYELID, FOLLOWED BY
INTERSTITIAL KERATITIS.

Reporter.	Sex.	Onset of Keratitis after Chancre.
1. Lang.....	Male.....	1 Year.
2. Lawford.....	Male.....	5 Months.
3. Marlow.....	Female.....	10 Years.
4. Trousseau.....	Not given.....	Not given.
5. Trousseau.....	Not given.....	Not given.
6. Valude.....	Male.....	4 $\frac{1}{2}$ Years.
7. Collins.....	Male.....	1 $\frac{7}{12}$ Years.
8. Collins.....	Female.....	3 Years. (Chancre of lip.)
9. Snell.....	Female.....	21 Years.
10. Carpenter.....	Male.....	4 $\frac{1}{2}$ Months.

CASE II. S. X., male, aged 39; primary lesion February 1, 1892, followed by unusually severe secondaries; gumma of ciliary body which perforated the sclera and necessitated enucleation; destructive uveal inflammation in the remaining eye terminating in secondary cataract, which was successfully removed, giving fairly useful vision; recurring attacks of uveitis over a long period of years, until, in 1901, or nine years after the initial lesion, he had a severe parenchymatous keratitis marked by a peripheral ring-shaped area of deep infiltration, showing a tendency to superficial ulceration in different spots. After several recurrences there finally appeared, about eleven years after the chancre, a sharp, well marked attack of diffuse interstitial keratitis with pronounced vascularization, which yielded to the active administration of mercury and iodides in about two months. Within a few months the patient died of cerebral syphilis.

CASE III. E. M., male, aged 50, consulted Dr. de Schweinitz at the University Hospital, July, 1904, because of severe interstitial keratitis affecting the central portion of the left cornea. The vascularization was not pronounced, and after failure to secure improvement under the usual routine treatment, carefully carried out, vigorous mercurial treatment was substituted, which resulted in so prompt a subsidence of the keratitis, that the diagnosis of its syphilitic nature seemed to be confirmed. The right eye remained unaffected.

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THE TELEOLOGY AND INTERPRETATION OF NYSTAGMUS.

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The peculiar disturbance of ocular motility which forms the subject of this paper has been one of particular interest to ophthalmologists, because of its frequent association with congenital amblyopia, to neurologists, as a concomitant of various affections of the central nervous system, and of late years, especially to otologists, on account of its practical importance as a symptom of labyrinthine involvement in otitis. The publications in this field are numerous, and there is a wealth of data as to the clinical details of nystagmus, the direction, rate, and character of the faulty movements, and a corresponding variety of theories as to their pathology, and mode of development. It is not the purpose of this paper to contribute to any of these subjects, but rather to review the material already at hand, in the light of a uniform hypothesis as to the nature and significance of the function of ocular fixation, and of its disturbances. It has seemed to the writer that something might be gained for the practical purposes of the clinician, oculist or aural surgeon, by a methodical analysis of this complex symptom; an attempt to explain its physiological and neurological, rather than its purely nosological significance, and to offer a tentative basis of interpretation from the standpoint of biology. At the very beginning of our investigation we are struck by the lack of uniformity in the clinical material, and the resulting discrepancy of statements as to the nature of the motor anomalies described as nystagmus, and further study soon leads us to distinguish two main classes of this anomaly which are different not only clinically, as has already been noted by A. Graefe, but as I believe, physiologically as well. A metaphysical consideration impresses on us, as a preliminary, the conception of ocular fixation as a function of dual significance to the sentient individual, having as its purpose not only the purely visual perception of things, as such, but

also and equally, the no less important conceptions of the relation of those things to the subject, and of the latter to the sum of things perceived or conceived, that is, to ideal space. It is a question how far these conceptions depend on visual and oculomotor impressions, whether they are directly due to sensory nerve action, at all, or whether, as physiologists of authority claim, they are not rather mediate results depending on processes of judgment. Recent advance in the study of the anatomy of the inner ear and its neural relations to other peripheral sense organs and to the cerebrum, would appear to show that there is a very intimate and complex relation between the labyrinth and the centers for associated movements of the eye, which logically postulates a corresponding physiological and psychological interdependence of these two organs. Breuer and Mach have shown that the labyrinth is the organ of perception for changes of position (static organ; otoliths) and direction of rotation (dynamic organ; semicircular canals) and any modern study of nystagmus must take into consideration not only the visual but the equilibrational aspect of this very involved and interesting question.

In his latest publication, an extensive monograph on the labyrinth, v. Cyon (1908) has even advanced the theory that the inner ear is the organ for the perception of direction, and mediately for the conception of time and space, and number. Three-dimensional space is a concept depending on a specific function of the three semicircular canals, and our geometrical systems, in fact, all mathematical ideas and reasonings are based on data received, originally, from the organ of hearing and equilibrium. The acoustic labyrinth, so-called, serves indirectly to bring about conceptions of time and number by the regular quantitative differences in the tonal perceptions which it mediates, and their reference by the psyche to logical, i. e., causal, factors. While much of this author's argument is metaphysical, his main thesis is based on many years of careful and varied animal experiment, and a most thorough and painstaking study of the phenomena of equilibration. However much we may hesitate, at present, to follow him to the logical limits of his far-reaching conclusions, there is no doubt that his theory of the labyrinth, starting, as it does with data which have formed the basis for the Breuer-Mach hypothesis, and by an imaginative yet thoroughly logical process of reasoning leading to an assump-

tion of almost infinite significance, must be taken into account in any scientific attempt at a philosophic analysis of our ideas of space, and must above all, lead to a broader conception of the functions of the organ of vision. It is this idea of the visual processes as part of a complex mechanism for the maintenance of equilibrium closely interrelated with the labyrinth, and with its cerebral centers for the judgment of direction, motion, and space—an idea which is neither original nor novel, yet which has been overlooked in theoretical discussions as well as in practice—that I have taken as a basis for my study of one of the most interesting and complex, as it is one of the most obscure of oculomotor anomalies.

My thesis is that nystagmus is neither clinically nor teleologically susceptible of a single interpretation and uniform characterization, but that we must recognize, in the multiplicity of disease forms, two main types, which differ widely, not only in their evidential features, but, as I shall attempt to show, in their mode of development, nosological significance, and psychological bearing. These two forms represent characteristic and superficially similar disturbances of ocular motility, but they can best be understood as anomalies, the one, of macular fixation, and the other, of eye motion for direction, ideal or actual, and, mediately, of subjective position, and of objective space. To indicate broadly the two forms which I wish to separate, we may speak of them in terms which have already been applied clinically, but which, as we shall see, are not strictly correct, as congenital and acquired, as visual and directional, as autogenous and reflex, as idiopathic and symptomatic, as paretic and spastic, according as our point of view is that of etiology, physiology, clinical analysis or neuro-pathology.* The application of these, and of a number of other methodological criteria, may now be made the basis of our differentiation.

*The characterization of either form of nystagmus by a single term, which shall be accurate as well as definitive, meets with the difficulties inherent in any attempt to equalize the conflicting claims of scientific terminology, and those of practical utility. "Congenital" and "acquired" are neither strictly true nor to be applied without limitation, as the first form is not inborn, but acquired in early infancy, before the development of the centers for fixation, while a practically identical type appears later in life, as a symptom of at least one affection of the central nervous system, namely, multiple sclerosis. This

Congenital Nystagmus.—This form is usually observed as a result of partial loss of vision in early infancy, before the function of macular fixation has been acquired. The theory that it is due to concomitant developmental arrest in the central nervous system, that it is in fact of neuropathic origin, has been generally abandoned, for the following reasons: It can not logically be supposed that the same selective action on a single center, that of fixation, would accompany a variety of ocular lesions, many of which are, evidently, not neuropathic at all. Again, there is frequently no developmental defect of the organ of vision whatsoever, the deterioration of vision being due to mechanical interference with the entrance of light into the eye, as in leucomata due to ophthalmia neonatorum, or to intraocular inflammation acquired soon after birth. Bumm has called attention to the frequency of retinal hemorrhages intra partum, and showed that these might become absorbed later on, leaving no trace, and giving color to the view that the resulting amblyopia and nystagmus were congenital.

Clinically this form might be described as an eye tremor, as it is a restless, pendulum-like motion (A. Graefe) in a

fact also militates against the use of the terms "idiopathic" and "symptomatic." The strict opposition of "visual" and "directional" or "fixational" is partially nullified by the obvious consideration that all nystagmus is to some extent at least visual. "Autogenous" and "reflex," again, are open to the objection that one form of fixational nystagmus, that occurring in paresis of the abducens, is, strictly speaking, autogenous, although clinically it is directional. The antithesis of the two types is not absolute, but approximate, only, except for forms which, as will be shown later, are at the two extremes of a continuous series which shows a number of mixed as well as of transitional forms. "Paretic" and "spastic" apply not so much to the muscular mechanism involved as to the centers of fixation and points of reflex excitation (labyrinth, cerebellum), which are in a state of partial or complete paralysis due either to the lesions of disease or to non-development, on the one hand, and in a condition of abnormal activity, as a result of pathological or artificial irritation, on the other. The congenital form is also spoken of as oscillatory or undulatory. Amblyopic nystagmus would, perhaps, be the best descriptive term. The acquired fixational form is now frequently referred to as "nystagmoid twitching," and might similarly be characterized as directional or equilibrational, if the latter adjective be not, as it so frequently and incorrectly is, limited to the labyrinthine type, a nomenclature which ignores the important role of vision and of ocular motions in the broad function of equilibration and the sense of direction and space.

certain definite direction, which, although independent of volition, does not hinder or inhibit voluntary eye-motions, but accompanies them in their individual type. The nystagmus may be horizontal, vertical, or mixed, or purely rotational, depending, in the last instance, on the action of the oblique muscles, in abduction, and on that of the superior and inferior rectus in adduction. The excursions are uniform and fairly rapid, and have absolutely no directional effect. That is, the net result of the ocular motion is an oscillation or undulation about a point which may be designated as the zero point or point of equilibrium. From a neurological aspect this undulatory nystagmus could be considered as a paretic tremor. The motion could be registered graphically as a wave similar to that of the double vibrations of a tuning fork; the ordinates representing the amount of excursion of the globe, and the abscissae, the time interval, with uniform, equal, and regular excursions on either side of the wave-path, resulting in equal positive and negative phases. Biologically we have to deal with a series of non-purposeive, or at least not adapted motions which are not in the interest of clear vision, and which from the phylogenetic standpoint might fairly be considered as a reversion to a lower type of function. Descending in the scale of animal life, we reach a more and more rudimentary form of fixation, which, apparently paradoxically is associated with increased complexity of structure, and apparent variety of function. At the lowest stage we have constant motion in place of interrupted, graduated and adapted action, which is fairly constant in intensity no matter what the stimulus. In this respect vision on this low plane resembles the tactile sense, from which, as we know, the sense of sight has been evolved, being spread over a large part of the ectoderm and susceptible, while only partly adjustable, to a great many stimuli. Functional evolution goes hand in hand with a regional limitation, and more marked differentiation of the respective phases of rest and activity. The motions of congenitally nystagmic eyes, like those of the invertebrates, suggest the pseudo-pods and tentacles of some marine animals, with their incessant, aimless weaving motion.

The development of a similar oscillatory nystagmus in later life as a result of disseminated sclerosis, and possibly of cerebro-spinal syphilis, also depends on destruction of once

normal supra-nuclear fixation centers, and has its analogy in other fields of neuro-pathology (senile tremor).

Congenital nystagmus is generally due to affections of both eyes, the most common causes being partial opacities of the media, remains of fetal disease, developmental anomalies, albinism, complicated or high grade refraction error, and color blindness. Amblyopia is the usual accompaniment. In these cases there is no sensation of eye motion or of apparent motion of objects in the external world. The nystagmic motions of the eyes are not seen in the mirror by these patients, who in this respect resemble normal individuals. The faculty of abstracting from this impression, or rather of not having any impression, is cited by Graefe as the highest attainment of empiristic training of the sense organs, like the regional exclusion of the image of one eye in strabismus. To the writer this phenomenon, at least in "congenital" nystagmus, appears to be susceptible of a more logical explanation on the assumption of a faulty development or a non-development of local signs, retinal as well as cerebral, under the influence of combined amblyopia and ocular tremor. Among other characteristics of vision in these cases we note that binocular vision is unchanged, that disjunction by prisms shows fixed images, and that stereoscopic vision and fusion reaction take place as usual. Voluntary motions of the eyes are usually limited, and have little or no effect on the degree of true congenital or oscillatory nystagmus. The latter has no symptomatic bearing, except in so far as it enables us to postulate an ocular lesion occurring in early infancy, and consequent non-development of the fixation faculty.

Acquired Nystagmus.—The most striking clinical features of this form of nystagmus are its frequent occurrence in labyrinthine and cerebellar disease, its association with vertigo, and the directional character of the eye motion. Neurologically it may be described as a clonic spasm of fixation; the twitching character being striking and invariable. A graphic representation of this form would show a series of half waves all on one side of the wave path, with a marked lack of correspondence between the ascending and the descending portion of the wave, although the amount of excursion and the rate are uniform. The ascending portion of the individual curve is almost straight, corresponding to the twitch of the eye. It is this rapid motion according to which

the nystagmus is said to be to the right or left, toward the affected side or toward the sound side, and so on, as it is the most striking of the two phases and seems to indicate the direction most accurately.

The descending curve is a more gradual and slower one, and represents a return to the position of equilibrium, that is, to the zero point, but it is to be noted that there is never a negative phase, and that consequently there is no oscillation. The net result is a directional clonus, as stated above. Studies of normal fixation have shown that this directional nystagmus corresponds exactly to the muscular adjustment of the eye in fixing objects in progressive motion through space. The rapid motion is a motion of compensation ("Einstellung" of the Germans) intended to bring a new object or series of objects into the field of macular fixation, and during this motion there is no distinct vision. A similar leap may be observed in reading the narrow columns of a newspaper, the compensation motion from right to left, i. e., backward to the next line being associated with only the most indistinct visual impressions. The slow phase of the curve is the actual fixational component, and this motion takes place in the direction of the motion of the objects in external space, following and keeping pace with their change of position, whether real or subjectively conceived. This form of fixation clonus, which is clinically identical with fixational nystagmus, may be observed in its most typical form in looking out of the windows of a moving car at passing objects. In spite of the intensity and frequency of these motions, which can be seen so strikingly in others, we are absolutely unconscious of them in our own eyes. The reason for this is probably to be sought in a psychological adjustment, by which the ocular motions are brought into logical, causal connection with the visible motion of external objects, and by unconscious judgment, causing us to abstract from and to disregard the ocular motion. It is significant that there is absolutely no vertigo in this form of fixation, and that the latter develops only, as Nagel has pointed out, when the external objects cease, apparently, to turn, and the subjective sensation of motion arises. The determining factor in the development of vertigo is accordingly neither the sensation of objective nor that of subjective motion, but a discrepancy of sensations, causing conflicting or antagonistic conceptions of position or motion. The resulting

confusion and disagreeable feeling which we call dizziness, and which is rarely a sensation of actual turning (rotational vertigo), might be explained by an application to the field of sensation of the principle of contrary innervation which Meltzer has adduced in analyzing motor disturbances such as cramp.

The symptomatic significance of fixational nystagmus depends on its strikingly directional quality, and to a certain extent on the manner in which it can be elicited. Thus there are forms of occupational nystagmus, such as that observed in miners, which is due to the combination of poor illumination and prolonged forced position of the eyes. The theories that this form is neuropathic, and that it is due to the bad air of the mines, have been disproven. The nystagmus is periodic, developing in poor light, and being elicited on forced motion of the eyes upward and to one side. There is false motion of objects causing intense vertigo, and accurate fixation is much impeded. According to Arlt, the nystagmus of miners was caused by hemeralopia with retinal torpor, and was to be considered as an automatic attempt to aid vision. Graefe has shown that this is incorrect, as low illumination does not cause retinal torpor, this symptom developing, on the contrary, as a result of overstimulation by bright light. Furthermore, these nystagmic motions are not originally voluntary, and as they cause a false sense of motion in objects, they must interfere with vision instead of aiding it. Hemeralopia is rarely associated with nystagmus, while darkness causes a permanent strain of fixation. The deciding factor is the strain of eccentric fixation, and miners' nystagmus must be considered as an intermittent clonic spasm, a functional neurosis, analogous to writer's cramp with paresis. Nystagmus with head nodding, as seen in infants with good vision, under the guise of spasmus nutans, nodding spasm, or tic de salaam, is a condition very similar to that described above and analogous in etiology. It has been found that these children were generally kept in dark, poorly-lighted rooms with a single small window or other light source high up and to one side. The elements of deficient illumination, and of forced eye position sufficiently explain the phenomena, which disappear when the children are kept in well-lighted rooms. Exclusion of fixation effort by bandaging the eyes immediately stopped the

head nodding, which was probably an attempt at compensation.

The significance of nystagmus in labyrinthine and cerebellar disease is a subject of great practical importance, but one which can only be considered very briefly in this paper. The clinical data are varied, and at times appear to be conflicting. Something may be gained for an easier understanding and a uniform interpretation of the facts if we consider nystagmus, in a broad way, as part of the somatic reaction, the oculomotor part that is, intended to restore supposedly or actually disturbed equilibrium. It has been shown that stimulation of the nerve terminals in the ampulla of a semicircular canal produces a sensation of turning in the plane of that canal, and that the resultant nystagmus corresponds to the change of position of external objects which would follow such a rotation. This reaction may be caused in normal individuals by actual rotation. In labyrinthine disease it is due to irritative lesions of the semicircular canal, and then develops spontaneously, or may be elicited by a number of artificial stimuli, such as mechanical pressure with a probe, syringing with hot or cold water, galvanism, or compression of air in the external auditory meatus. The results are uniform in so far as the sensation of turning is always toward the irritated side, and the rapid motion of the nystagmus, similarly, to this side. Hot water, and the cathode closure, act in this respect, as irritants. The same holds good of otitic cerebellar disease, the nystagmus and sense of rotation vertigo being toward the side of the lesion. In these cases the nystagmus may be spontaneous, while the stimuli applied to the labyrinth, as mentioned above, fail to elicit purely local reactions, showing that the otitic lesion has resulted in a destruction of the sensory terminals in the inner ear, and excluding this region as a source of nystagmic reflex. In both otitic and cerebellar disease there is frequently a turning of the head in association with the eye motion. This head turning is always away from the affected side as would be expected, if we consider this motion as part of the somatic reaction for compensation of disturbed balance, as an automatic reflex adjustment of the body in accordance with a sensation of rotation or of loss of balance. The apparent discrepancy of eye and head motion disappears if we realize that correction in one instance is

normally connected with central fixation of external objects, and in the other with a readjustment of the head to the rest of the body, and of the latter to its own supposed change of position in space.*

*Nagel has shown that we can construct a series of dizziness forms along a line at one end of which we have purely visual and at the other equilibrational disturbance. One extreme would be represented by the dizziness in diplopia, due to actual paresis of a muscle or induced by prisms and the blurred and distorted images produced by cylinders or doubled lines of type. At the other end we find the purely rotational vertigo, caused by rapid turning, and in an intermediate position the mixed forms, due to irregular changes in the visual field with more or less disturbance of equilibrium, as in ships, swings, and so on, as well as the form caused by swinging mirrors. Similarly we may arrange nystagmus in a line ranging from the purely visual forms to those which are equilibrational. The observations of Nagel, Delage, Cyon and others, would seem to disprove Barany's hypothesis that vertigo depends on nystagmus, and that it does not develop if nystagmus is prevented, as by exclusion of visual impressions. We have seen that nystagmus may occur without the slightest vertigo, and experiments with prisms and cylinders show that the converse also holds good.

Peters, Snell and others have recently advanced a theory of the labyrinthine origin of miners' nystagmus. This assumption is not in accordance with all the clinical facts, and is unnecessary if we consider the eye, as we must, as an essential factor in equilibrium, and as intimately related for the purposes of this function with the nerve terminals in the semicircular canals through their cerebellar end-stations.

Another characteristic and striking feature of fixational nystagmus is the degree to which it is influenced by voluntary positions of the eye. Thus it is always more marked and frequently can be elicited only in certain definite extreme positions, and grows less marked or disappears entirely when the eye is placed in the opposite, or in a position of equilibrium. In paresis of an ocular muscle, this position of choice corresponds to the sphere of action of the affected muscle, thus in abducens paresis nystagmus develops on attempting to look toward the paralyzed muscle. In many other forms of fixational nystagmus a similar condition is observed. Thus, opening both eyes, or the exclusion of one may affect the amount of nystagmus, which may develop spontaneously as a form of associated movement on attempting to close the lids or to look upward. Such reactions are common in hysteria.

In labyrinthine nystagmus indicating irritation, nystagmus is increased on looking toward the affected side, and may disappear entirely on looking in the opposite direction. This has its analogue in physiological fixation of objects in motion, the range of fixation effort being much greater and the innervation more intense when looking toward the source of motion, as toward the locomotive from a car window, than in the opposite direction, i. e., backward along the track. The mechanical explanation of this difference is that in the one case voluntary

deviation effort is added to the reflex twitch, while in the other the two motions are antagonistic and tend to neutralize each other.

The role of fixation effort and eye-strain is strikingly evidenced in cases of acquired nystagmus cured by correction of errors of refraction. According to Barany, only slow movements of the eyes are innervated from the vestibule, rapid oscillations originating in the supra-nuclear centers for fixation. Light narcosis inhibits rapid oscillations together with voluntary movements, while the slow form of nystagmus is not affected. In case of paralysis of the supra-nuclear fixation center, vestibular irritation causes slow movements only, of the eyes, while nystagmus does not occur. As we have paralyzes of associated ocular movements (convergence, binocular fixation, conjugate abduction), due to central lesion, so we may assume developmental anomalies or irritation states due to the lesions of disease, causing spasmodic, uneven, or excessive reaction to normal stimuli. Nystagmus from this point of view could be considered as a fixational intention tremor or as an ataxia of the gaze.

The anatomical basis for this reaction is the connection of the labyrinth through Deiter's nucleus and the cerebellar cortex with the center for associated motion, conjugate deviation to the same side. It has been shown that the labyrinth is in connection with the abducens of the same side, and with muscles which turn the head and trunk toward the opposite side, an arrangement which again shows the uniformity of response to reflex irritation resulting in disequilibrium, if considered as a somatic reaction of correction or readjustment.

No. 60 East Fifty-eighth Street.

REPORT OF TWO CASES OF SYMPATHETIC OPHTHALMIA.*

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The following cases seem worthy of report on account of their fortunate termination. They are, briefly, as follows:

CASE I. Mr. B., seventy-one years old, rheumatic, but otherwise in good health, called me to see him December 28th, 1906, on account of an attack of pseudo-membranous conjunctivitis in the right eye. He was sent to the hospital, where he remained until January 24, 1907. The attack was severe, with scant discharge but intense swelling and some enlargement of the pre-auricular and cervical lymph glands (I considered the attack a Parinaud's conjunctivitis). The temperature at first ran up to a little more than 100°. The cornea became necrotic early, and at the time of his discharge the whole lower half of the cornea was flattened and cicatricial, with iris included in the scar, as the result of a perforating ulceration. The lens escaped during the attack.

February 22d he went South, with the eye entirely quiet and without tenderness on pressure.

April 21st, he returned with a low grade of iritis in the left eye which had appeared three days previously. The pupil was contracted, there were several posterior synechiae, and both eyes had marked ciliary tenderness. He was admitted to the hospital at once and the right eye, which had only light perception, was enucleated. The vision of the left was 20/100. He was put on full doses of bromides, hot water applications every three hours, mercury vasogen one dram twice daily, and the following morning two leeches were applied to the left temple. He was kept in bed with the eye bandaged. Atropin was used very gradually but in sufficient quantity to keep the pupil partially dilated. It was impossible to rupture the synechiae, and the attempts were early

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abandoned. Until April 25th he had considerable pain, and morphin enough to control it was administered.

April 25th, he was put upon a dosage of fifteen grains of aspirin every two hours while awake, the mercury being discontinued, and thereafter his treatment consisted of rest and attention to the general health, diet, etc., with from 125 to 150 grains of aspirin in the twenty-four hours. He improved steadily, the irritative attacks became less frequent and less severe, and finally, May 18th, he was discharged from the hospital with a vision of 20/70, the eye quiet, the pupil of normal size, but with three or four posterior synechiae. Aspirin was continued in doses of fifteen grains three times a day until May 25th. He continued gradually to improve until in October the vision was 20/30, in December, 20/20, and in January, 20/20, with the correcting lens. There were no retinal or nerve changes and but few floating vitreous opacities.

The pupil moves quite freely at present, in spite of the synechiae, and the vision remains the same. The light sense is somewhat reduced, probably on account of a certain amount of organized exudation which remains on the anterior surface of the lens.

Examination of the enucleated eye showed dense cellular infiltration of the iris and ciliary body with inclusion of the iris in the corneal scar tissue.

CASE II. Charles S., sixty-two years old, was admitted to the hospital July 27, 1907. He was of good general health, but rather lacking in robustness. In a fight one week before, a finger was stuck in his left eye. There was a severe keratohypopyon, with the anterior chamber half full of exudate, moderately increased tension and severe pain. A keratome incision was made by Dr. Dean Foster, and the hypopyon evacuated. The following day the hypopyon having reaccumulated, was again evacuated, but the pain and increased tension continuing with steady progress in the corneal ulceration and infiltration, a Saemisch section was done August 10th. His recovery following this was uneventful, and he left the hospital August 27th with a large cicatrix in the lower part of the cornea in which the iris was included. Vision in the eye was light perception only.

September 27th, he was readmitted with a low grade of iritis which had been coming on for three days. There were

two small posterior synechiae which ruptured after the instillation of atropin. Pain and photophobia were severe, and there was considerable ciliary tenderness in the left eye, which was at once enucleated. Vision of the right was 4/200.

He was put to bed, the eye bandaged, enough atropin was used to dilate the pupil, hot water applications begun, and a free catharsis instituted. He was given mercurial inunctions for five days and aspirin in fifteen-grain doses was given from September 29th to the time of his discharge from the hospital, increasing rapidly to 130 grains in the twenty-four hours. He improved gradually and was discharged October 19th, with the eye quiet, the pupil well dilated, vision 20/200, and considerable vitreous haze. His vision gradually improved, under the administration of iodide of potassium, until in the February following, the vitreous was entirely clear, vision 20/40, and there remained only some diffuse chorioidal atrophy in the macular region.

The examination of the enucleated eye showed an intense plastic uveitis, with inclusion of the iris in the corneal scar, as in the former case. The whole uvea was filled with lymphocytes and epithelioid cells. The chorioid was involved throughout.

In considering the treatment of sympathetic inflammation, one cannot but be struck with the fact that it seems, in the light of experience, to assume a certain form. Whatever may be our views as to the pathology of the condition, the treatment is quite analogous to the treatment of septic infection in other parts of the body.

First in importance is rest and freedom from irritation. The circulation should be kept quiet by absolute rest in bed and all tendency to irritation of the eye through light should be avoided by bandaging. The most limited examinations consistent with a proper knowledge of the progress of the case should be made. Every one knows how intensely irritative such cases are, and I am sure that I have seen bad results follow a too prolonged examination. I am in the habit of using a very subdued light, and at first do not use a condensing lens at all. These precautions should be kept up until the ciliary circulation is almost free from hyperemia.

Atropin should, of course, be used, but rather guardedly. It must be borne in mind that the most severe infiltrates are apt (judging from the examination of the exciting eye) to

be found in the ciliary body and anterior part of the chorioid, at least in a certain proportion of cases. The iris inflammation is important chiefly through its tendency to lead to the formation of posterior synechiae, being rather dwarfed by the inflammation of the ciliary body and its effects on the nutrition of the eye, and therefore only enough atropin should be used to keep the pupil moderately well dilated. If this fails to keep the pupil open, nothing is gained by forcing the atropin. If this latter be done, in a certain number of cases a damming back of the blood into the ciliary body occurs and the ciliary hyperemia is actually increased. I am accustomed to use atropin with great caution, and if synechiae have formed which cannot be ruptured, I use only enough to secure the greatest dilatation allowed by the synechiae. If increased tension supervene, I at once stop the atropin and confine myself to pilocarpin instillations, stopping even these if they are not effective in reducing the tension. Eserin I never use in this connection. If the vascular excitation persists, the tension is very difficult to control, and it is better to rely on morphin and general measures than local ones which are but too apt to increase the irritation.

Hot water applications should always be used and may be applied as frequently as every hour. They tend to relax muscular cramp in both the iris and ciliary body, and have an important effect in stimulating the lymph circulation.

It goes without saying that the general health should receive the most careful attention and the nutrition should be kept up by studying the individual case, being careful not to over-stimulate the circulation.

For general administration, the drugs which resist plastic formation, the salicylates, mercury, iodide of potassium, and quinine, have been long advocated and continue to be our only hopeful line of treatment. The chief value of mercury is probably in cases with a latent specific tendency, and on account of the difficulty of excluding this, it is almost always wise to begin treatment by a vigorous exhibition of mercury by inunctions. The tonic value of quinine cannot be denied, but personally I have not had much success in its administration in this class of cases. It is difficult to give very large doses, the toxic effects are annoying, and I have always been in doubt as to its real value. Iodide of potassium is of value principally in the later stages of the attack.

Salicylate of soda in large doses, as advised by Harold Gifford, has always seemed to exert a favorable influence, but here again we are confronted by the difficulty of administration. It frequently nauseates the patient, and the tinnitus is apt to be severe. Aspirin (or acetyl-salicylic acid) was very well borne in the two cases reported. The deafness and tinnitus were not very marked in either case and passed off during the continued administration of full doses. Very little difficulty was experienced in its administration as far as the digestion was concerned. It was given at first in capsules, then in milk, in brandy, and in one case with stewed fruits. There was no nausea nor digestive disturbance to speak of at any time, and the variations in its administration were simply to avoid the unpleasantness of taking so much tasteless powder.

I am strongly of the opinion that the aspirin had a great deal to do with the recovery of the two cases reported. That both cases were due to a form of disease in the exciting eye which makes for one of the less severe types of sympathetic uveitis cannot be denied, but it is also true that any case of sympathetic inflammation is a most serious condition, and if not carefully treated is apt to go on from bad to worse, so that all cases of recovery from this disease are worth considering.

No. 19 East Forty-fourth Street.

ANGIOMA OF THE CHORIOID.*

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BOSTON.

PATHOLOGICAL EXAMINATION BY F. H. VERHOEFF, M. D.,
BOSTON.

Bessie B——, age eleven, was seen at the Massachusetts Charitable Eye and Ear Infirmary, August 30, 1907. The story was as follows: A short time after birth the parents noticed that the right eye had a peculiar look, as if there was a white substance inside of the eye. As the child grew older this condition became more noticeable. The sight was always defective, and for a number of years there has been absolute blindness. For several years the eye has at times been red and painful.

Examination shows a well developed girl of eleven. On the right lower lid, extending down onto the cheek, is a nevus,—port-wine mark. On looking at the eye, your attention is at once attracted by a yellowish reflex from the fundus; this is easily seen at a distance. The vision of the eye is nil, there is slight ciliary injection, the pupil is moderately dilated and displaced to the left, there is no pupillary reaction, the iris is atrophic, there are a few blood vessels upon the iris, the anterior chamber is shallow. Tension plus. Examination of the fundus shows a complete separation of the retina, the retina being pushed well forward.

A diagnosis of secondary glaucoma was made. The eye had the appearance of glioma or pseudo glioma, the history of long duration practically ruling out a malignant growth. The eye being painful and having no vision, enucleation was advised. Operation under ether without incident. The report from the laboratory revealed the true nature of the case.

Angioma of the chorioid is very rare. Parsons, speaking of the rarity of this condition, says that it should not be con-

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fused with angio-sarcoma, which is less rare and very malignant. The condition is congenital and is apt to be associated with nevus of the face. Most of the cases have been observed in young people, but the age of reported cases ranges from five to sixty-nine.

Diagnosis is possible only after pathological examination. The first symptom usually complained of is disturbance of vision; then ensues a period in which the sight gradually diminishes, or it may remain stationary for a number of years, only to fail suddenly. Then follows a second period in which there is complete blindness, but the eye remains quiet and free from inflammatory symptoms for several years. Eventually the eye becomes inflamed, the tension is increased, secondary glaucoma develops and enucleation is required to relieve pain.

Meller reports a case of angioma of the chorioïd in a woman of thirty-three, who accidentally discovered impairment of vision five years before the onset of glaucomatous symptoms. During the five years there had been gradual loss of sight, leading to complete blindness, but no attack of pain. During this period the patient was greatly annoyed by photopsia, in the shape of fiery rings, the attacks lasting several minutes. Meller thinks photopsia is due to mechanical irritation of the retina, caused by the varying pressure of the angioma.

Angiomata usually occur in the posterior part of the chorioïd, but may occur in any part. Parsons thinks that they show no uniform relationship with the fetal chorioïdal cleft, as only two cases are reported as definitely situated in the lower quadrant. The tumor may involve all layers of the chorioïd, or simply the chorioïdea. They usually have no capsule and fade off imperceptibly into the surrounding normal chorioïd. The minute structure is that of ordinary cavernous angiomata, there are a number of large irregular spaces filled with blood, the spaces are lined with endothelium and separated from one another by thin fibrous walls.

Pathological Examination.—After fixation in formalin, the globe was sectioned without freezing. Diameters of globe: antero-posterior, 24.75 mm.; vertical, 23 mm.; horizontal, 24 mm. The cornea, 12 mm. in diameter and 1 mm. thick, is clear. The anterior chamber is 2 mm. deep and free from coagulum. The filtration angle is blocked by the root of the iris and converted into an opaque membrane. The pre-retinal space contains a delicate fibrillated tissue, evidently contracted



FIG. 1.—Photograph, showing angioma of chorioid in greatest cross section.

vitreous humor. The sub-retinal space contains coagulum. The chorioid over the greater part of the fundus is replaced by a reddish friable mass whose cut surface on close examination is seen to have a finely honeycombed appearance. This mass surrounds the disk, but does not extend over its surface. On the temporal side it attains its greatest thickness, 7 mm., and reaches the equator. On the nasal side it reaches the ciliary body, but attains a thickness of only 2 mm. The greater part of the surface of the mass is covered with a layer of hard material, apparently bone, in places 2 mm. thick. To this posteriorly, the retina is firmly united. Adherent to the surface there are also several small collections of blood containing glistening dots.

Histological Examination.—Decalcification in 5% nitric acid. Celloidin sections. The cornea shows a few superficial scars but is otherwise normal. The episcleral tissue shows marked venous congestion, but no infiltration with inflammatory cells. The iris is highly atrophic, and at the periphery, where it is united to the ligamentum pectinatum and cornea, its stroma has in many places entirely disappeared, leaving the pigment layer alone. The ciliary body and processes are atrophic, but much less so than the iris, and are markedly congested. There is no cyclitic membrane. The separated retina everywhere shows advanced gliosis and is much disorganized by cicatricial contraction. The multipolar ganglion cells and the rods and cones have entirely disappeared.

Microscopic examination of the chorioid shows that it is pervaded throughout by a cavernous hemangioma. The blood spaces are remarkably uniform in size, averaging about .14 mm. in diameter. None of them contain thrombi. Their walls usually consist of an extremely thin layer of connective tissue, which stains feebly after Van Giesen's method, lined by a single layer of endothelium. The spaces are so closely placed that often the same wall serves for two, while not infrequently the spaces are separated by a layer of endothelium only. The stroma of the tumor, aside from that forming the walls of the spaces, is also extremely scanty, consisting of delicate fibrillated connective tissue situated in the triangular area between the blood spaces. Sections stained differentially for elastic tissue show none present within the growth. The tumor thus consists mainly of a mass of blood permeated by an insignificant amount of connective tissue.

Pigmented chromatophores, evidently remaining from the original chorioid, are fairly abundant in the tumor. Their pigment fails to give the iron reaction and is readily bleached by the method of Alfieri. Strangely enough, the tumor proper contains no pigment which gives the iron reaction. In places however, the retinal pigment epithelium is packed with iron pigment arising no doubt from repeated intraocular hemorrhages.

The normal structure of the chorioid is almost entirely lost except just behind the ora serrata. The chorio-capillaris, however, is frequently intact, although it is sometimes replaced by fibrous connective tissue. A large portion of the surface of the growth consists of plates of true bone, the medullary spaces of which are frequently filled with adipose tissue. Sometimes they contain the cavernous tissue of the angioma proper. The pigment epithelium is lost over the thickest portions of the bony plates, but is continued over their margins, so that their origin is plainly in the chorio-capillaris. The pigment epithelium shows an enormous development of colloid excrescences. These are especially marked anteriorly, where by fusing together they form in places an almost continuous layer. Some of them show calcification, but none have become organized or ossified, and are clearly not concerned in the formation of bone. Beneath them the choriocapillaris is often intact, while the elastic tissue of the membrane of Bruch is always so. Many of the colloid bodies show in addition to the well-known concentric lamination, a fine radial striation. This is best seen in sections stained in phosphotungstic acid hematoxylin. The membrane of Bruch fails to show the granular degeneration commonly seen in association with colloid excrescences in senile eyes. The small hemorrhagic extravasations attached to the surface of the growth contain no fibrin, and show no disintegration of their red corpuscles, although the latter stain more feebly than normal. The presence of numerous characteristic spaces left by cholesterol crystals shows, however, that the hemorrhages are fairly old.

Neither the optic nerve nor the retina extending out from it have been invaded by the growth. The nerve stem is completely atrophic. Serial sections of the sclera at the points of exit of two of the vorticos veins fail to show any extension of the growth through the sclera. The veins themselves show

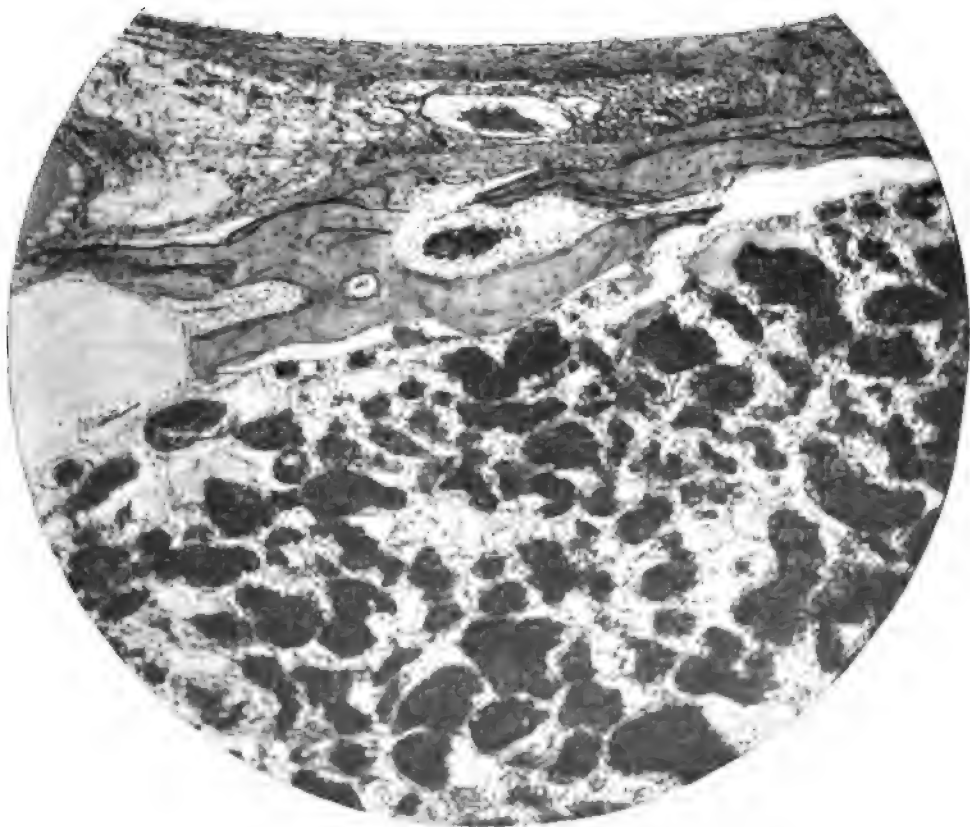


FIG. 2.—Photograph of section, showing angioma extending from choroid into optic disk. Mag. x-16.

marked endophlebitis. There is also endovasculitis of some of the posterior ciliary vessels, with complete obstruction in some cases.

Pathological Diagnosis.—Cavernous angioma of chorioid, Ossification of chorioecapillaris. Secondary glaucoma. Calcareous cataract. Separation of retina. Intraocular hemorrhages.

277 Dartmouth Street.

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ANGIOMA OF THE ORBIT, WITH INVASION OF THE GLOBE ALONG THE CILIARY NERVES.*

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PATHOLOGICAL EXAMINATION BY F. H. VERHOEFF, M. D.,

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Angiomata may be divided into three classes—Vascular Naevi, Telangiectases, and Cavernous.

Simple naevi are due to an excessive development of capillaries, they vary greatly in size, are usually on the same level with the skin, and may be bright red in color, or of a darker hue, having the so-called port-wine shade. This form is always congenital, and shows little tendency to spread..

Telangiectases show a network of dilated capillaries, are similar to naevi in structure, but differ, in that they are rarely congenital, being acquired, and that they are more apt to increase in size.

The third class, cavernous angiomata, have a distinct tumor formation; they consist of a framework of connective tissue with chambers of varying capacity and many enlarged vessels. They are usually acquired, and appear soon after birth.

The head is a favorite site for angiomata and many are seen about the orbit. In the lids they may appear as simple naevi, or they may be situated more deeply, and are then seen shining through the skin with a bluish lustre. The latter consist of a mass of large sized blood vessels, readily felt through the lid.

Primary angiomata of the conjunctiva are very rare and are usually situated at the inner canthus, starting in the caruncle. Most cases are originally situated in the lid, and have gradually passed over onto the conjunctiva.

Two forms of angiomata are usually found in the orbit, one involving the anterior part, and associated with the same con-

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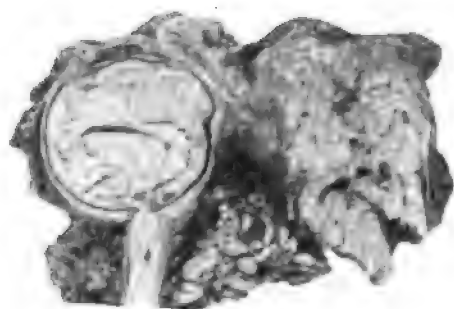


FIG. 1.—Photograph of sectional tumor and globe, showing invasion of corneal limbus, sclera, chorioid and optic disk.

dition in the lid. It starts in the lid, extends back into the orbit, is not sharply defined and has no capsule. The second form, cavernous, usually develops within the orbit itself, its favorite location being within the muscle cone. It has a firm white fibrous capsule, grows slowly, pushing the eye forward. Angiomata of the orbit seldom if ever pulsate and there is no bruit. Forced muscular exertion, coughing or sneezing often causes an increase in size of the tumor, while pressure often diminishes it.

For the cure of angiomata, various lines of treatment have been employed, such as electrolysis, cautery, nitric acid, injection, ligation and extirpation. Removal is the best line to follow wherever possible, and it should be done early, on account of the tendency to increase in size.

The following case illustrates this tendency of a vascular tumor to increase. It started in the lid, invaded the orbit and then the globe.

Thomas M., age 32, was seen at the Infirmary in the fall of 1907. In infancy there were a few dilated blood vessels in the conjunctiva of the lower lid of the left eye. The temporal portion of the ocular conjunctiva also showed the same condition. This condition remained stationary until about the age of twelve, then the angioma rather suddenly increased in size, the lower lid became swollen and the eye was pushed forward. Following this period of activity the process remained quiet for about ten years. At the age of twenty-three the lower lid became more swollen, and electrolysis was used with some benefit. Then ensued another period of rest for about six years, only to be followed by renewed activity. The swelling, which up to this time had been confined to the lower lid, extended to the upper, the eye became more prominent, and for the first time difficulty in closing the lids over the eye ball was experienced. Slow but gradual increase in the size of the tumor, caused increasing exophthalmos, and the cornea became ulcerated from exposure. Up to the time of corneal involvement, the vision remained nearly normal in the eye. For the past ten days the eye has been very painful.

At the present time, October, 1907, marked exophthalmos exists, the eye ball appears to be wholly out of the socket, both lids are markedly swollen, and the lower one everted. There is no motion of the eye ball. The cornea is ulcerated. Through the skin of the lower lid is felt a hard tumor about

the size of a large walnut. There is no pulsation or bruit. Examination of the naso-pharynx is negative—no glandular enlargement.

Under ether, the outer canthus was divided, the eyeball was freed from the conjunctiva and muscles above, and then the eye with tumor attached was dissected from the lower lid and orbit. The tumor was firmly attached to the orbit by numerous fibrous bands. There was considerable hemorrhage during the operation; no large vessels were cut, but there seemed to be a general oozing from the whole surface of the tumor. The eyeball with tumor attached was about the size of a goose egg. The external canthus was sutured, and the orbit packed with gauze. Recovery without incident. Following the operation, the question arose as to whether anything ought to be done to the lids. They had been enlarged and distended for so long that they appeared like empty pouches, after the contents of the orbit were removed. It was decided to let them alone, and they gradually diminished in size. A letter from the family physician was received nine months after the operation, saying that the lids were about normal in size, and that there had been no recurrence.

Pathological Examination.—The specimen, consisting of a large tumor mass with the eye enclosed, was fixed in Zenker's fluid. The section made through the greatest diameter of the mass almost exactly bisected the globe, passing through the center of the cornea and the middle of the optic disk and nerve. (Fig. 1). The tumor consists chiefly of two rounded nodules connected together. The largest is below, and measures 3 cm. in diameter. The other nodule represents an extension backward into the orbit, and measures 3.7 cm. x 1.7 cm. in greatest cross section. In addition to this, the larger nodule sends a number of firm band-like prolongations into the orbit. The tumor presents a sharp outline anteriorly, but posteriorly it passes more or less diffusely into the orbital tissue. The larger nodule is in direct contact with the globe, and anteriorly has sent an extension into the bulbar conjunctiva, lifting it up in the form of a mound 3 mm. to 5 mm. high, all around the limbus. The cut surface of the growth shows an abundant fibrous stroma permeated with blood vessels of all sizes. Most of the vessels show extremely thick walls.

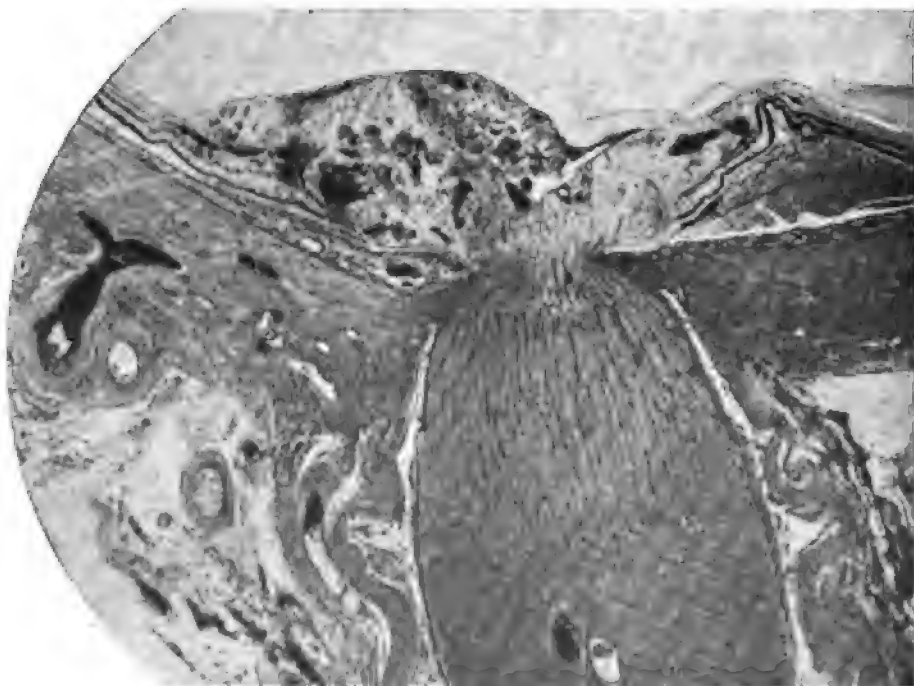


FIG. 2.—Photograph of section, showing cavernous structure of angiolipoma and ossification of chorio-capillaris. Mag. x-62.

The globe measures 25.5 mm. antero-posteriorly, 23 mm. vertically. The cornea shows a large central ulcer 5 mm. in diameter, containing a clear central area 2 mm. in diameter. The bulbar conjunctiva is swollen as already described, and overreaches the cornea 2.5 mm. The anterior chamber is 4 mm. deep and filled with bloody coagulum. The pupil, 2.5 mm. wide, is free from membrane. The filtration angle is not occluded by the iris. The iris and ciliary body are swollen. The lens, 8.5 mm. x 5 mm., is clear. The vitreous humor is coagulated after fixation. The chorioid is in situ, and appears thickened around the disk. The retina is also in situ, except on one side of the disk, where it shows a small localized separation with coagulum beneath it. The disk is greatly swollen, to 3 mm. in diameter and 2 mm. high, suggesting choked disk. The swelling, however, is uneven, the lower portion showing the greater elevation. The lower portion also shows an excessive vascularization. Immediately below the nerve the sclera is highly vascularized by vessels which are in continuity with the tumor, and which seem to pass into the thickened chorioid. The subdural space of the nerve is not distended.

Microscopic examination shows the tumor to be a teleangioma. The connective tissue stroma is fibrous or hyaline, unusually abundant, and forms no definite capsule. There are few hemorrhages. Vessels of all sizes are numerous, but where the tumor is invading the surrounding tissue those of capillary size are most frequent. None of the new formed vessels, even the largest, show a well marked muscular coat, but many have a few muscle fibers at the periphery. The walls of the larger vessels are as a rule extremely thick and composed chiefly of tissue apparently identical with that seen in senile endarteritis, except that it is free from degenerative changes. This tissue represents the intima, and resembles the proliferated intima of angiosclerosis also in not occurring as an even layer, but as nodules along the walls of the vessels. It consists mainly of stellate cells, and after hematoxylin and eosin staining shows only a slight amount of intercellular substance. The latter often stains decidedly blue. Mallory's phosphotungstic acid hematein shows, however, an abundance of fibroglia fibrils in relation with the cells, so that it would seem proper to speak of the tissue as fibroglia. Within and around this tissue, a differential stain for elastic tissue shows

always a certain amount of elastic tissue, sometimes an excessive amount. The stroma of the tumor is also rich in elastic elements.

The growth shows a marked tendency to invade nerves both large and small. The nerves are evidently first invaded by capillaries which enlarge, and finally destroy the nerve substance. Sometimes a large vessel is found whose origin in a nerve is apparent only from a small amount of nerve substance attached to its inner wall. The nerve tissue is definitely recognized by the arrow head markings of the myelin sheaths. The presence of nerve tissue within the lumen is a certain indication that the vessel was not formed by the gradual enlargement of a single small vessel, and at first glance makes its origin seem difficult to explain. Careful study of a large number of sections, however, shows that such vessels are formed by the gradual breaking into each other of small cavernous blood spaces within the nerves. The nerve thus becomes canalized as in the case of a thrombus.

Individual striated muscle fibers are also attached by capillaries of the tumor which grow within the endomysium and finally replace the muscle substance. Around the invading capillary the endomysium often proliferates, while the endothelium of the vessels also proliferates, causing complete obstruction in some cases. In this way whorl-like structures are formed which simulate the pearly bodies of endotheliomata.

Microscopic Examination of the Globe.—The mound of tissue around the limbus is found to be conjunctiva invaded by the growth. At the limbus on each side, the corneo-scleral tissue is deeply invaded, and one section shows the invasion to have reached the canal of Schlemm. The cornea shows a central suppurating ulcer which presents the peculiarity of having a sequestrum in its center. The sequestrum shows complete hyaline necrosis, and in it scarcely a nucleus of any kind can be seen. No bacteria can be brought out within it by the Gram method. The sequestrum takes up the anterior three-fourths of the corneal stroma, and is sharply defined. Behind, and around it, the stroma is densely infiltrated with pus cells, many of which are necrotic. Descemet's membrane is destroyed, and the infiltrate is in continuity with the exudate in the anterior chamber. The epithelium has disappeared from almost the entire surface of the cornea, and the latter shows the appearance characteristic of drying. The anterior

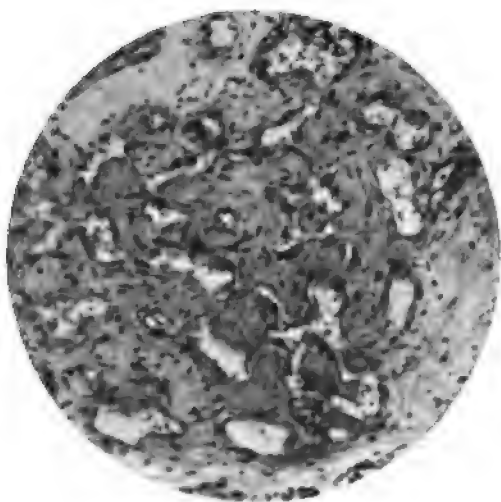
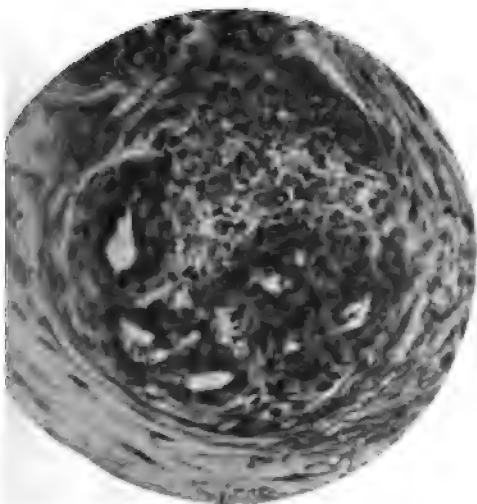


FIG. 3.—Showing structure of nodule in optic disk. Mag. x-130.



IG. 4.—Ciliary nerve in cross section ded by vessels of angioma. Mag. x-216.



FIG. 5.—Showing canalization of posterior ciliary nerve at entrance into sclera. Note mass of nerve tissue remaining within the lumen. Mag. x-33.



FIG. 6.—Showing invasion of striated muscle. Mag. x-50.

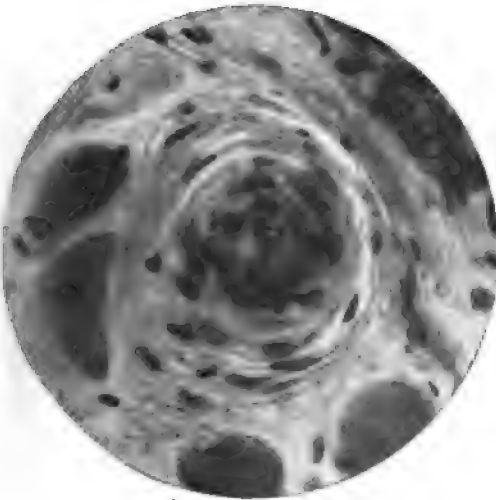


FIG. 7.—Vessel of angioma replacing striated muscle fiber. Proliferation of endomysium of muscle fiber and complete obliteration of lumen of vessel by endothelial proliferation. Mag. x-388.

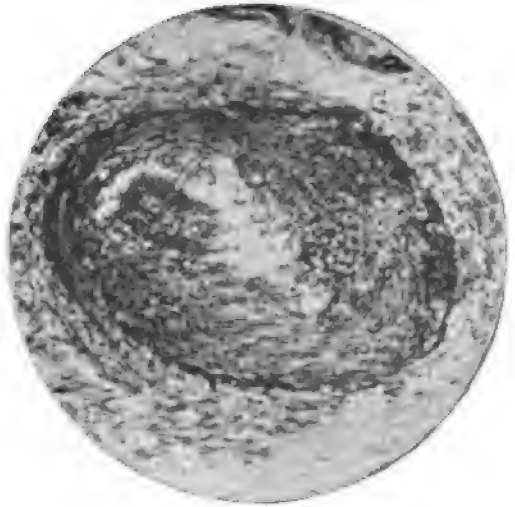


FIG. 8.—Excessive proliferation of intima in blood vessel of angioma. The new tissue is composed of fibroglia intermingled with elastic fibers. The elastic tissue is especially abundant at the periphery. Differential elastic tissue stain. Mag. x-105.

chamber is filled with exudate composed of pus and blood, most of the cells being necrotic. The iris shows a comparatively slight infiltration with pus cells, but contains many chronic inflammatory cells. It is giving off a marked exudate of pus cells from its posterior surface. The ciliary body is only slightly infiltrated, and the exudate from its surface contains numerous phagocytic epithelioid cells in addition to the more abundant pus cells. The chorioid shows no purulent infiltration, and only an insignificant perivascular infiltration with lymphoid cells just posterior to the ciliary body. The pars optica retinae is almost free from infiltration, but occasionally one of its vessels is found surrounded with lymphoid cells. Here and there it is giving off phagocytic epithelioid cells into the vitreous body. The retina and chorioid are otherwise normal, except in the vicinity of the disk, as will be described. The vitreous humor is infiltrated with pus cells anteriorly, but posteriorly contains numbers of epithelioid and lymphoid cells.

Just below the optic nerve entrance, the sclera has been invaded by the tumor. The new vessels are seen growing within the clefts of the sclera, and in places extending into the chorioid. Most of the vessels are small, but frequently small cavernous spaces are formed, due apparently to the smaller vessels opening into one another. The appearances presented suggest that in every instance the invasion has taken place along a nerve, even when the nerve substance is no longer recognizable. The portion of the chorioid invaded is that extending immediately around the optic disk for a distance of about 3 mm. At one edge of the disk the chorioid is increased to about double its normal thickness. The invading vessels are most of them of almost capillary size, but vessels which take up nearly the entire thickness of chorioid are also seen. In the affected region, the stroma of the choroid is more abundant and denser than normal. All the layers of the chorioid are involved in the growth except the chorio-capillaris and the membrane of Bruch which are everywhere intact. At the lower margin of the disk the new growth of vessels continues into the disk, and then extends partly into the retina. One very large vessel can be followed along the course of a posterior ciliary nerve into the chorioid, where it branches, one branch passing backward into the disk. In the disk the growth forms a fairly well defined nodule. The remainder

of the disk shows simple edema with some hemorrhages, as does the retina around it. Near the disk the retina is separated from the chorioid by albuminous coagulum. Within the nodule the fibrillar tissue of the disk has been largely replaced by hyaline connective tissue, remains of the original tissue being represented by proliferated neuroglia. No fibroglia or smooth muscle fibers are present. From the surface of the nodule and disk an exudation of epithelioid and chronic inflammatory cells is taking place, called forth no doubt by the inflammatory condition in the anterior part of the eye. Some of the blood spaces within the nodule are filled with recent fibrinous thrombi.

The nerve stem is not edematous and appears normal. The central vessels are somewhat dilated, but are otherwise normal except far back where they run in the pial sheath. Here the artery shows well marked endarteritis. The nerve stem has not been invaded by the tumor.

Pathological Diagnosis.—Hemangioma of orbit. Invasion of ciliary nerves, sclera, chorioid, and optic disk. Suppurative keratitis.

Remarks.—The most important histological features of this case are, the marked tendency of the angioma to invade and extend along nerves, the invasion of individual striated muscle fibers with formation of whorl-like structures, the marked subendothelial proliferation in the larger new formed vessels, with production of fibroglia and elastic tissue, and finally, the invasion of the interior of the globe, especially of the optic disk.

The invasion of the nerves was first by vessels of about capillary size, which later became enlarged, and in some instances formed a cavernous structure. Sometimes the intervening walls of the cavernous spaces thus formed, entirely disappeared, so that a large nerve trunk was converted in a single blood vessel. The whorl-like structures produced by the invasion of striated muscle fibers simulated those of a dural endothelioma, but here the concentric laminae were apparently produced partly by proliferation of the endomysium around the invading vessel.

The occurrence of the marked endothelial and subendothelial proliferation in the vessels of the tumor, with production of tissue similar to that seen in arterio-sclerosis suggests a possible explanation of the exuberant growth of the tumor. For

it seems probable that toxic substances in the blood which in some individuals give rise to arterio-sclerosis, might cause the abnormal vessels of a nevus to take on exaggerated growth. In this particular case the presence of such toxic substances was suggested by the marked endarteritis displayed by the central retinal artery. On the other hand, it seems equally possible that the endovasculitis both of the tumor vessels and of the central artery was compensatory in character, and due to the high localized blood pressure associated with the tumor.

The keratitis in this case was apparently due to exposure, but the extensive involvement of the ciliary nerves suggests the possibility of a neuropathic origin.

The invasion of the interior of the globe by orbital angioma, with the formation of a nodule in the optic disk apparently has heretofore never been recorded, and the fact that the invasion occurred along the posterior ciliary nerves seems particularly noteworthy.

277 Dartmouth Street.

RECURRENT TRAUMATIC EROSION OF THE CORNEA—REPORT OF A CASE DUE TO LACRIMAL STRICTURE.*

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This was a typical case of recurrent erosion following superficial injury, in this case a scratch of the cornea of the left eye by the point of a fern leaf. The patient, a married woman, 28 years old, came under my observation in October, 1904, two years after the original injury, and six months after the first sign of recurrence. During these six months there had been marked exacerbations and remissions, and occasionally short intervals of almost entire absence of the symptoms. The case had been under treatment several times, but without benefit, excepting temporary relief of pain. On examination, the left eye showed slight conjunctival catarrh, moderate photophobia and lacrimation, and a central vertical faint gray line on the cornea measuring 2 by $3/4$ mm.; the pupil was dilated from a solution of atropin, which the patient had been using at home. The right eye was normal.

Vision, O D 18/15 Hm 0.25,

O S 18/24 Em.

There was constant discomfort, but pain only for about two hours after waking. Treatment now begun, was the use of silver nitrate solution 1/480 for the conjunctival catarrh, and yellow oxide of mercury ointment 1/120 at bedtime with massage, and massage on waking, and before opening the lids, as recommended by Stood. This treatment was without benefit excepting that the morning pain seemed somewhat less severe. After eighteen days of this treatment, a slight distension of the left lacrimal sac was noticed, and pressure on the sac forced its contents into the nostril. The patient then gave a history of old lacrimal obstruction beginning long before the corneal injury, and shown by constant slight lacrimation, and occasional visible distension of the lacrimal sac.

*Read before the American Ophthalmological Society, New London, Conn., July 15, 1908.

which would appear at times and disappear. This condition had never been treated. On passing a probe, a stricture was found in the upper portion of the duct, which yielded readily to repeated probing. After dilatation of the stricture there was complete disappearance of all symptoms of irritation, and the gray opacity of the cornea gradually faded, leaving no trace; after which, vision of O S was 18/15 Em. There has been no recurrence.

Recurrent traumatic erosion of the cornea has a characteristic subjective symptomatology on which the diagnosis is based; the objective signs are variable and have given rise to different ideas of its pathology and etiology, as is shown by the titles under which it has been described, viz., recurrent or relapsing traumatic erosion, recurrent traumatic vesicular or bullous keratitis, and recurrent traumatic keratalgia. As pointed out by De Schweinitz and by Stood in 1901, the conditions described under these titles are the same, except in the appearance of the corneal lesion. This may be an erosion, a vesicle, or may be not demonstrable. The primary injury is a superficial one caused by semi-blunt force; a scratch by a finger nail, or a corner of stiff paper, or the point of a leaf. There is no apparent injury of Bowman's membrane. After a few days, all symptoms of trouble cease, and there is apparently perfect recovery. But after an interval varying between a few weeks and many months there is a return of all the symptoms of the original injury, pain, photophobia, lacrimation and ciliary hyperemia, and in addition to these the characteristic symptom of this disease occurring on waking from sleep, and described as a feeling of adhesion between lid and globe, and of rupture of the adhesion on opening the lids; this followed by the pain and other symptoms of corneal abrasion, lasting for an hour or two. During the remainder of the day the eye is nearly or quite free of discomfort, but the same trouble appears next morning, and day after day. It is assumed from this history that there is, in fact, adhesion to the lid of the imperfectly formed new epithelium, and that this epithelium is torn away on opening the lids. An erosion is left which later becomes a vesicle by a new growth of epithelium forming the anterior wall of the vesicle, and still later there is absorption of the vesicular fluid, leaving no trace of erosion or vesicle, until the closing of the lids during sleep furnishes opportunity for a repetition of the process.

The condition is that of imperfect healing of epithelium, without apparent abnormality of Bowman's membrane. This imperfect healing has been attributed by different writers to different causes; it has been thought to be a neurosis like herpes zoster; a neuritis of the nerve terminations with trophic disturbances; a result of mechanical factors, minute foreign bodies interfering with the normal growth of epithelium, or alteration of the surface of Bowman's membrane preventing normal adhesion of the cylindrical epithelial cells to the membrane. Stood adopts this last explanation based on the statements of Rollett, Lott, and Langerhans that normally the deepest layer of epithelium adheres to Bowman's membrane by means of little processes which pass into the clefts and furrows of the membrane. Ewing's observation of fatty degeneration of Bowman's membrane in a case of bullous keratitis in a glaucomatous eye favors the belief that Bowman's membrane has a part in the etiology of both conditions. Treatment recommended has been excision of the wall of the vesicle, cauterization, curetting, and the use of ointments with or without massage. Quinine has been advised in the cases of supposed neuritis. I have found no reference to lacrimal disease, except Stood's general statement that in case of infection of the floor of the vesicle the lacrimal passages may need attention.

The purpose in reporting this case is to call attention to the possibility which the case suggests, of the imperfect healing being due to the presence of tears in abnormal quantity. It is well known that tears have such influence on operation wounds of the lower lid, and especially where there is ectropion and imperfect lacrimal drainage; so that it is very difficult to get perfect healing in such cases. It also suggests the thought that the infection of cataract operation wounds attributable to lacrimal disease may be due as much to the imperfect healing and diminished resistance caused by the abnormal quantity of tears as to the presence of an unusual number of bacteria.

301 Keith and Perry Building.

ABSTRACTS FROM ENGLISH OPHTHALMIC
LITERATURE.

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**A Case of Unilateral Congenital Fistula of the Lacrimal
Sac, with a Review of the Literature.**

TYSON, HENRY H., New York (*Archives of Ophthalmology*, July, 1908), reports the youngest case ever recorded, and the first one in which the fistula was noticed practically at birth, so that there could be no doubt about its being congenital. In all the other cases with the exception of one, which was noted when the child was two years of age, they were first noticed at periods ranging from ten to forty years after birth. The symptoms about which complaints were usually made to the physician were the accumulation of tears in the corners of the eyes with epiphora, and a moisture over the aperture, especially when out in a strong wind or upon using the eyes very

much for near work causing fatigue; and in the writer's case a chapping of the face beneath the fistula during the cold weather. An examination of the case reported revealed a minute vertically oval capillary opening, which would admit a needle probe, situated over the center of the right lacrymal sac immediately below the canthal ligament and about 5 mm. from the punctum lacrymale, the edges of which were not thickened, elevated, or depressed, being on a level with the surrounding skin and through which the tears exuded. None of the cases received any treatment except astringent collyria, which did not relieve the condition. The writer proposes to attempt to close the fistula with the galvano-cautery.

H. G. G.

Dermoid Tumor of the Conjunctiva.

LEVITT, M. J., Brooklyn (*New York Medical Journal*, July 18), reports the case of a baby five weeks old who had on the sclerocorneal margin a tumor 8 or 9 mm. long, 6 or 7 mm. broad and 2 or 3 mm. thick. It was somewhat hard in consistence. There was no inflammation and the rest of the eyeball was clear. Four months later the growth was somewhat enlarged, and encroached more on the cornea. The baby was fat, well nourished, and presented no other abnormality. Immediate removal was advised, but the mother preferred to wait until the child grew a little older.

M. L. F.

Bacteriology and Treatment of Serpiginous Ulcers of the Cornea.

GALLEMAERTS, M. (*Amer. Journal of Ophthalmology*, January, 1908), gives some interesting data in re the bacteriology of the so-called serpiginous ulcers of the cornea, and the different treatments depending on the infection.

He cites thirty-nine cases, the microbes being—staphylococcus pyogenes aureus, Morax-Axenfeld diplobacillus, pneumococcus and the streptococcus. The staphylococcus was present in only one case, in conjunction with an abundant secretion.

The corneal diplobacillus ulcer (Morax-Axenfeld) he found to be fairly common, observing twenty grave cases in one year, with only four of these cases giving a history of trauma. In a certain number of these cases the keratitis was only a small

limited marginal ulcer; in others there was a great tendency to spread, the ulcer being irregular with ramifications and not infrequently hypopyon and iritis, with smaller ulcers around the principal focus.

The treatment advised for this form of infection is zinc sulphate, washing the conjunctiva with a 1% sol. t. i. d., and once a day cauterizing the ulcer with a cotton pledget soaked in a 1 to 40% sol.; a bandage being applied till the epithelium is reformed. In none of the cases did the author find it necessary to perform a paracentesis or to employ the galvano-cautery.

As the sulphate of zinc, when brought in contact with cultures of the diplobacillus, does not kill them or even arrest their growth until after several days, the author cannot explain the results obtained unless the sulphate of zinc enhances the bactericidal qualities of the conjunctival secretions in some peculiar way. In which case the diplobacilli, which as Stock's microscopical researches show live on the surface, are rapidly destroyed.

The pneumococcus infections of the cornea and conjunctiva he describes as the Fraenkel-Weichselbaum diplococcus, which, contrary to the diplobacillus, penetrates deeply into the corneal lamellae, and is found not in the superficial layers of the ulcer but among the leucocytes in the whitish ring which surrounds the ulcer.

Fourteen of these cases were treated in one year, eight of them with Roemer's serum. Ten of the fourteen gave a history of trauma, and in all but two cases hypopyon was present, in two a dacryo-cystitis.

His results with Roemer's serum, which is a polyvalent bactericide, are especially interesting owing to the conflicting opinions regarding its usefulness.

He decides from the clinical picture which ulcers need serum and which do not. The latter show less reaction; the grayish white ring surrounding the ulcer is barely visible, and the infiltration instead of being spread widely is more limited. The former are surrounded by a white zone with small disseminated foci and are associated with a high hypopyon.

Of the mild forms some were treated by scraping the ulcer and cauterization with iodine in essence of juniper 5%; others with the galvano-cautery, and others more severe by the Saemisch operation and paracentesis of the anterior chamber.

In eight cases after the old methods had given no results, or had failed to stop the progress of the ulcer, Roemer's serum was used. With one injection of 10 cc. the change was marked; the pain disappeared, the hypopyon decreased, and the ulcer was arrested.

From these clinical facts he believes that there are several varieties of pneumococci as regards their virulence, and cites Roemer's experiments which show that the virulence varies in the enormous proportions of from 1:40 to 1:150,000.

In conclusion M. Gallemaerts states that he believes it to be a duty to make a bacteriological analysis of all corneal ulcers and to base the treatment on the result; also that the term seriginous ulcer can no longer be reserved alone for pneumococcus ulcer, since different microbes, especially diplobacilli, can cause it. The term should always be completed by the designation of the microbic species which causes the keratitis.

G. H. W.

Some Etiological Factors in Interstitial Keratitis.

RISLEY, SAMUEL D., Philadelphia (*Ophthalmic Record*, July, 1908), referring to the etiological factors in interstitial keratitis, says although it is probably true that inherited syphilis is responsible for the majority of cases of interstitial keratitis it should be borne in mind that other affections which may be named "Diseases of Nutrition" are often the cause of this disease. He gives the history of two cases of interstitial keratitis neither of which presented any symptoms of syphilis, yet both patients were victims of a serious morbid state, and both made rapid recovery under the administration of the thyroid gland of the sheep.

O. W.

Hypopyon Iritis, Associated with Epidemic Cerebrospinal Meningitis.

TOOKE, FREDERICK, Montreal, Can. (*Ophthalmology*, July, 1908). An infant of two years died after five days' illness from epidemic cerebrospinal meningitis. During the last two days inflammation of the cornea and iris was present. The eye was removed after death and a microscopic examination made of the tissues showed little or no change in the sclerotic and chorioid,*a slight infiltration of the several layers of the

retina by lymphocytes and some polymorphonuclear cells, the cells being much more abundant in the layer of rods and cones and in the ganglion cell layer. At the ora serrata the infiltration of the retina became much more pronounced, and in the pars ciliaris retinae it was intense. The optic nerve was not swollen and there was no infiltration about the walls of the central vessels of the nerve. The dural coat was normal but the arachnoid consisted practically of an infiltrated mass of lymphocytes and was firmly bound down to the pial sheath and nerve trunk. The ciliary body was tremendously infiltrated with blood corpuscles, mainly of the small mononuclear and polymorphonuclear variety. The iris was practically in the same condition as the ciliary body, only in a more intense degree of inflammation. Some of the capillaries were contorted and the endothelial cells were swollen, occasionally there was a lymphocyte or polymorph in the blood stream, some adherent to the vessel walls and others migrating through the walls of the capillary. In the anterior chamber the lower filtration angle was completely occluded by a purulent exudate.

A. F. A.

Prenatal Iridocyclitis, Inherited Syphilis.

RISLEY, S. D., Philadelphia (*Ophthalmology*, July, 1908), reports a case which strikingly illustrates the persistence of the syphilitic taint, even after a long course of mercurial treatment. The parents of the patient were born in Ireland, were strong and vigorous. They lived in their own comfortable home and owned two houses as the result of their industry and thrift. The wife, a bright, strong woman had suffered four miscarriages, but syphilitic taint was denied by both man and woman. They were both put on mercury and iodide of potash for a long time during which two healthy children were born. Thinking themselves cured they neglected further medication and soon the subject of this report was born. She had the usual syphilitic dyscrasia and was apparently blind or nearly so, in both eyes, with complete annular synechiae in both. The balls were small, and soft, but the anterior chamber in each was shallow. A mercurial bandage was prescribed and worn for months. The general nutrition improved, the eruption vanished and the child grew and improved in health.

The right eye gradually became hard, slowly enlarged and gradually passed into the buphthalmic state. It was finally

removed and measured 36 mm. in antero-posterior diameter. There remained perception of light in the other eye and an iridectomy was done because of increasing tension, inflammation and pain. The vision gradually failed for eight years, when she could perceive shadows only. She soon became feeble-minded. Her parents at last sank into poverty and the father died a drunkard and syphilitic wreck.

Three points are noted: First, the remarkable efficiency of mercury in holding in abeyance, at least, the baleful consequences of the syphilitic infection. Second, the doubt which must ever be present in the mind of the medical man regarding the ultimate curability of syphilis. Third, the efficiency of iridectomy in saving some eyes from progressing buphthalmus, as the tendency to enlargement of the ball and the pain never returned after the operation.

A. F. A.

A Small Sarcoma of the Ciliary Body.

VERHOEFF, F. H., Boston, Mass. (*Ophthalmology*, July, 1908), reports a male, aged 65, who stated that nine months ago he discovered that the sight of his left eye was almost gone and that six weeks ago he was attacked by severe pain in the eye, which had persisted. The eye was moderately congested and at the inner limbus the conjunctiva showed a small, slightly elevated area, dark brown in color. The cornea was hazy, insensitive and its posterior surface was covered with deposits. The iris was swollen and hyperaemic, the pupil moderately dilated and irregular, the lens cataractous. The tension was +, the eye had no vision and there was no light reflex from the pupil. The eye was enucleated and the pathological examination showed the pupil to be blocked by a delicate membrane, the lens cataractous, the retina and chorioid in situ, no retinal hemorrhages, the disk glaucomatous. In the upper outer quadrant of the globe there was a small, black globular tumor attached to the ciliary body just posterior to the ciliary process, 3.5 mm. in diameter and 21.5 mm. high, which was found to be a densely pigmented, round-cell sarcoma. It had invaded the inner layers of the ciliary body only, but had infiltrated the latter extensively. It possessed no capsule, being covered directly by the vitreous humor. Almost all the growth above the surface was completely necrotic. The black tumor of the limbus was attached directly to the sclera.

ABSTRACTS, ENGLISH OPHTHALMIC

The tumor cells infiltrated the surrounding the underlying sclera numerous groups of red, both along the vessels and in the clear one section a group of tumor cells was seen the lumen of a vein. The endothelium numerous clumps of cells adhering to it, apparently tumor cells. A row of pigments seen in some sections of Descemet's membrane of the iris and at its root and on the clumps of tumor cells. Similar cells were vitreous. The choroid was normal, thin atrophic, the vein was narrowed to one-third and the artery was completely occluded. found in the posterior part of the eye. Two of the case are that the tumor of the limb that of the ciliary body and on the opposite and was not a direct extension but a true coma was due to blocking of the filtration ; the necrosis of the ciliary tumor was due to vitreous and the advanced endovascularitis of vessels seems to indicate that in many reconstruction of the central vessels the obstruction cause, but the result of the glaucoma independent upon the increased blood pressure due to high intraocular pressure.

Some Observations on Cataract

ELLIOTT, R. H., Madras (*Journal of Otolaryngology*, August, 1908, and *Indian* June, 1908), begins his article with these

"Some twelve years ago a distinguished branch told me that 'anyone could take disagreed with him, inasmuch as it appeared was not so much the 'taking out' of the cataract, as the way it was done. The cataracts passed away since then have only served my early belief; so much so that after some six to seven thousand cataracts, I am more than ever how much there is to learn."

He is very careful in the selection of cataracts for them under observation until it has been

the adnexa of the eye are in a healthy state, and treating any diseased condition until the eye is able to successfully pass the test of the "experimental bandage" for twenty-four hours. Mild treatment he finds usually the most efficacious in curing conjunctival troubles, but when these fail he resorts to more heroic remedies. Obstruction or inflammation of the lachrymal passage calls for extirpation of the sac. Prior to operation he uses Herbert's method of irrigation of the conjunctiva with a perchloride solution 1-3000. The value of these precautions is shown by his figures. In 1897 he lost from sepsis 6.11%, in 1907 0.275 to 0.40%. The instruments are boiled, and to avoid touching the lid with the knife during the operation, he is accustomed to rotate the eye inward during the puncture and till the moment of counter-puncture when the eye is brought back to the midline for the finish of the section. He is also careful that the sterilized speculum is not allowed to brush the edge of the lid while it is being inserted. No instrument is used twice without sterilization, and the operation end of no instrument is allowed to touch the operator's hand, the pillow, the patient, or anything except the eye of the patient. He has noticed that practically every man who has not had large practice makes the same mistakes, and has formulated the following rules for their guidance:

1. Never be in a hurry; there is lots of time.
2. Take a light hold with the conjunctival forceps, and avoid pressure on the globe. It is this forceps pressure on the globe that leads to so much vitreous escape. The object of the forceps is simply to steady the globe.
3. For tearing the capsule, choose a needle (Bowman's), the shank of which is at least as big as the blade. Too large a blade means too large a cut, and consequent leakage alongside the needle during laceration. Such an accident need never occur with a suitable needle.
4. Enter your knife point in the needle puncture; it will slip through more easily and fill up the hole at the same time, thus avoiding aqueous leakage.
5. Do not rotate the knife on its axis or aqueous will escape.
6. Do not carry the counter-puncture back into the sclerotic; it adds much to the difficulty of the section.

Learn to bring it out in the corneoscleral junction. This is more difficult than it sounds.

7. On making the counter-puncture, push the blade boldly on with a sawing movement, so as to make a large part of the section in the first cut. At the same time turn the edge of the blade slightly forward, so that it may ride harmlessly over the iris. This turn should be made almost with the counter-puncture. It saves the iris from being scraped.

8. Cut in the plane of the knife-blade and not at an angle with it. If this direction is obeyed, a sharp knife cuts its way out without effort.

9. Do not attempt brilliant sections. Finish your section slowly and gently. This will minimize the danger of sudden squeezes of the lids which are likely to cause vitreous escape.

10. To minimize the size of the artificial pupil, seize the iris at its pupillary edge with a narrow grip and cut, holding the scissors at right angles to the corneal section.

11. Do not pinch the iris with the forceps; but seize it as gently as possible. Also avoid all drag on it. You will thus give your patient no pain; he will not shriek, and you can do your operation easily without fear of pulling the iris edges into the section and impacting them there.

12. Make your section big enough for easy delivery; small sections spell disaster. You should learn by the use of the needle during laceration of the capsule what kind of lens mass and to some extent what size of lens mass to expect, and you can graduate your section accordingly.

13. Be content with the delivery of the nucleus and any cortex which readily accompanies it by manipulation. Anything left can easily be washed out. This is a safe and an easy procedure.

14. Replace the iris thoroughly. This can be done with the irrigation stream directed under the iris or over its surface, or placed on the lips of the wound from outside, according to the case. Failing there, use a curette; or seize each iris edge in turn with iris forceps and pull it into place. One should not rest content till a keyhole pupil is obtained.

15. If the pupil looks very black and the vitreous body presses against the cornea, obliterating the aqueous cham-

ber, it is a sure sign that the hyaloid membrane is thin and that vitreous escape will ensue if the operation be pushed.

16. Never interfere with an opaque posterior capsule left after delivery of the lens. It is more safely and better dealt with later by discission after the section is soundly healed.

17. Remove floating portions of the anterior capsule with iris forceps, but be ready to close the eye at once if the vitreous threatens to present in the wound.

18. A mass of cortical matter is often found impact below the sclerotic lip of the incision, having broken off from the nucleus in this position when the edge of the latter made its way forward to escape by the incision. Such a mass is contained in its corresponding portion of capsule. If the latter be seized and drawn toward the pupil, the cortex is emptied into the chamber and can be easily washed out; the capsule should be removed first in the grip of the forceps.

19. If a lens fails to present in the section, when pressure and counterpressure are applied, the failure may be due (1) to insufficient laceration of the capsule, (2) dislocation of the lens upward beneath the sclerotic lip of the incision, (3) falling down of a Morgagnian nucleus into the lower part of the chamber, (4) too small size of incision, (5) if iridectomy has not been done to rigidity of the iris and, (6) if the suspensory ligament of the lens is ruptured to the lens having fallen backward into the vitreous. Insufficient laceration is made by lacerating the equator of the lens with the knife or needle through the section.

20. Great care should be taken to avoid a lens delivering by rotation on the horizontal lateral axis (right to left axis); this puts a dangerous strain on the hyaloid membrane; it is due to dislocation of the lens under the sclerotic lip; the upper part of the lens becomes fixed there and the lens can only deliver by turning upwards and forwards on the horizontal axis. This should never be allowed; the lens should be replaced in position by pressure with a curette and then delivered.

21. A lens which is a tight fit for its section may often be delivered quite easily by rotating it when once impacted in the section on its antero-posterior axis; this can be done with a curette applied to the edge and stroked round it;

the action is like that of turning a cartwheel on the axis by seizing the tire and turning it round.

22. When the chamber empties during needling, owing to the blade of the needle being too large or to the knife having been introduced with its edge the wrong way, or to any other cause, the chamber may be easily refilled through the small nozzle of the irrigator against the puncture and turning on the stream. One is at once placed again in the position to work with a full chamber.

In the after-treatment he has dropped subconjunctival injections of sterilized air and of chemical solutions and uses the normal saline solution alone. He is positive that this hastens the resorption of cortex. The injections are repeated twice a week until the pupil is clear.

A rare form of corneal opacity, which he does not remember to have seen reported, is thus described: The leucoma is frequently ring-shaped, though the ring may be very irregular; more rarely it assumes the form of a round patch fading away at the edge; it clearly lies on the deeper surface of the cornea, or at least is most intense there; it is frequently situated in the neighborhood of the section, though it is occasionally met with far away therefrom; rarely there may be two or even three such spots. A careful examination with a corneal loupe never fails to show the cause of the phenomenon; a fine tag of capsule is seen running up to and attached to the back of the cornea opposite the densest part of the opacity. Moreover, such opacities are commonly associated with a delay in the healing of the section. The latter point is of much interest, as it may place in our hands a ready means of bringing about closure of the chamber in obstinate cases which has defied all our efforts. If the capsule tag can be seen, it is seized with forceps and torn, when the section at once heals. Of course, there are much more common causes of unhealed section than this, viz., a poor state of the patient's nutrition and interference with eye on the part of the patient.

The author is strongly convinced of the utility of iridectomy as a routine stage of extraction. He performs preliminary iridectomy in cases of immature cataract, and after trial of various operations for the artificial matura-

tion of cataract, prefers the operation of Foerster, although he regrets that it is so unreliable.

Over 50% of his patients complain of cyanopsia after extraction for a few days, 2.8% complain of erythropsia, 1.2% of yellow or green vision. M. L. F.

A Rare Form of Complicated Cataract.

ZENTMAYER, WILLIAM, Philadelphia, Pa. (*Ophthalmology*, July, 1908), reports four cases, two being brother and sister and the other two being cousins of the preceding, who presented much the same conditions as those described by Purtscher in his description of cases of similarly complicated cataract, three of his cases being brother and sisters. They presented bluish-white, porcelain-like scleras; very deep anterior chambers; dull-gray-brown irides; a marked differentiation in the large and small arterial circles; small pupils, which were sluggish to reflexes; a marked iridodonesis and fluid vitreous; and a predisposition to cyclitis and detachment of the retina. The author's cases were operated on by discission with good results.

A. F. A.

Sarcoma of the Chorioid with a Report of Three Cases.

LE FEVER, C. W., Philadelphia, Pa. (*Ophthalmology*, July, 1908), reports three cases of sarcoma of the chorioid.

Case I. aged 45, stated that within one year the vision of the left eye had become somewhat dim. Examination revealed several areas of chorioid degeneration along the course of the inferior temporal vessels and a rounded gray elevation about 3 mm. high and wide, with a sharply defined outline, crossed by the inferior temporal vein. Three years later the retina became completely detached and there was no perception of light. Enucleation was performed, and there has been no recurrence after two years.

Case II, aged 61, stated that for fourteen months the vision of the left eye had been failing. He suffered one attack of temporal neuralgia of the left side ten days before the consultation. The eye was not injected. Aside from senile changes in the chorioid there were several yellowish-gray areas in the macular region, occupying a space

twice the size of the disk. Two years later the vision had decreased to 5/cc. and the mottling was more marked, but no elevation was discovered. One year after this the retina was detached over more than half the fundus on the temporal side of the disk and elevated 6 mm. No inflammatory symptoms were present, but there was a history of an inflammatory attack resembling secondary glaucoma a few weeks before. Perception of light only was present. Enucleation was done under local anaesthesia, and after a year the patient was in good health.

Case III, aged 54, reported failure of vision for the preceding eight months. A rounded black mass was seen in the temporal fundus, without detachment of the retina. One month later the tumor had encroached on the disk. Enucleation was done, and the patient has remained well for ten months.

About 70% of the reported cases of sarcoma of the chorioid occur between the ages of 40 and 70 years, although no age is exempt. The small round celled variety is the most malignant, and also has the most rapid growth. The probability of complete eradication of sarcomata is greater when they occur within the eyeball than at any other point in the body. Statistics show that 30% of the cases operated upon recur either locally or by metastasis, the latter being by far the more common manner of recurrence. Actual recurrence will not usually be delayed more than five years. Since traumatism is a known element in the causation, any instance of new growth in the vascular tissue or retinal detachment in an eye known to have been previously injured must be looked upon with suspicion. Enucleation is to be recommended as early as the diagnosis can be made and during enucleation the greatest care should be exercised not to unduly manipulate, rupture or squeeze the globe, lest sarcoma cells be forced into the tissues or the blood circulation. For at least five years after the operation the patient should be under close observation for recurrence of the growth.

A. F. A.

Tear in the Retina.

FRIDENBERG, PERCY, New York (*Ophthalmology*, July, 1908), reports an unique case. The patient, aged 18 years,

erous diet and recommended to spend eight hours daily in the open air. Within a few weeks there was a decided improvement which continued with treatment for sixteen months, when she discontinued treatment. She died about two years later, after having suffered for several weeks with severe pain in and around the right eye and base of the brain, total blindness of the right eye and great exophthalmus, and atrophy of the optic nerve in the left eye.

O. W.

The Management of Squint.

BRADBURN, A. A., Southport, England (*Ophthalmology*, July, 1908), mentions and elucidates the methods of correcting squint. He considers it very difficult to develop the fusing faculty in the brain after the child is over six years of age. He mentions six methods of procedure: 1, correction of refractive error in order to make the amount of vision equal in the two eyes; 2, occlusion of the fixing eye, to force the deviating eye to take part in vision; 3, instillation of atropine in the fixing eye only, for the same purpose; 4, training the fusing faculty by means of Worth's amblyoscope; 5, the use of Maddox prism, to develop the weak muscles by exercise; 6, operation, to equalize the tension of the muscles, when the lack of balance is too great to be overcome by the preceding means.

A. F. A.

Palsy of the Extraocular Muscles in Graves' Disease.

POSEY, WM. CAMPBELL, Philadelphia (*Ophthalmic Record*, June, 1908), reports two cases of palsy associated with Graves' disease.

Both patients were women, one of whom showed Graefe's, Stellwag's and Möbius' signs, and had palsy of the right superior rectus muscle. The other showed Dalrymple and Graefe's signs, and had palsy of the external recti, the left superior rectus and inferior oblique muscles.

In a previous paper on the same subject the writer stated that palsies of the extraocular muscles in ophthalmic goitre are not extremely rare and are to be regarded as part of the morbid process of Graves' disease.

O. W.

"A. The pathologic changes in the optic nerve in multiple sclerosis; B. The types of fields of vision, and the corresponding changes in the optic disks; C. Retrobulbar neuritis that is probably an early symptom of multiple sclerosis; and D. The causes of retrobulbar neuritis other than multiple sclerosis." In recapitulation, disturbances of vision are found in about half the cases of multiple sclerosis. Usually the dimness of vision is noticed early in the course of the disease, and it may come on long before any other symptoms have attracted attention. More than half of the patients with multiple sclerosis who complain of failing sight have a central scotoma in the field of vision, and the ophthalmologic diagnosis of their condition is retrobulbar neuritis. Toxic cases of retrobulbar neuritis, due to poisoning with tobacco, alcohol, lead, and the toxins arising in pregnancy are readily recognized and diagnosed as toxic. The causation of non-toxic retrobulbar neuritis, however, has often been obscure. We have learned recently that many of these cases are due to sphenoidal and particularly to ethmoidal disease, which involves the optic nerve in the optic foramen. In the writer's opinion we shall soon come to the belief that a non-toxic retrobulbar neuritis, if not due to a sinusitis or directly to syphilis, diabetes, a neoplasm, or trauma, is, as a rule, a manifestation of multiple sclerosis, although no other symptom of the disease may be present. H. G. G.

Probable Tumor of the Pituitary Body with Optic Atrophy, Following Premature Menopause.

WYLIE, ELLA R., Boston (*Ophthalmic Record*, May, 1908), reports a case of probable tumor of the pituitary body with optic atrophy following premature menopause in a patient 26 years old, in whom menstruation had ceased permanently two years previously. Six months before being seen by Dr. Wylie there was failure of vision in the right eye and inability to read. Vision was P. L. right eye, 8/10 left eye, reading J. 5 with difficulty. In the right eye the optic nerve was white with central vessels slightly contracted. The left eye showed pallor of the optic nerve.

The patient was put upon iron and strychnia in ascending doses, alternating with iodides, daily salt baths, gen-

of accommodation in 167 patients is given, showing how wide the variations may be from Donders' curve.

Toxic Symptoms Following the Instillation of Homatropine Hydrobromate.

LE FEVER, CHARLES, Philadelphia (*Ophthalmic Record*, June, 1908), reports a case of toxic symptoms following the instillation of homatropine hydrobromate.

The patient was a married woman, aged 35, of a nervous disposition. The solution used was homatropine hydrobromate, gr. 1/2; aq. dist. m. xxiv. One drop was instilled into each eye and two hours later the instillation was repeated, followed by two more at ten minute intervals.

She soon complained of light-headedness and of dry sensation in her throat. Within ten minutes she was irrational with thickened voice and hallucination of sight and hearing, could not stand alone nor grasp any object with certainty. Her face was slightly flushed, and the pulse, slightly accelerated at first, became slow and moderately full within an hour. Four hours later she was sufficiently improved to be taken home in a cab, and within three hours from that time she had practically recovered.

O. W.

Diaphanoscopy of the Eye.

WUERDEMANN, H. V., Milwaukee, Wis. (*Ophthalmology*, July, 1908). Diaphanoscopy is a method of illuminating the interior of the eyeball by a beam of light, much as the sinuses of the face are transilluminated by an electric bulb placed in the mouth. Its usefulness is limited to the examination of the anterior two-thirds of the globe. In a dark room the tip of the instrument is placed in contact with the lid or on the scleral conjunctiva and the difference in the translucence or transparency of the various tissues affords a very satisfactory method of differentiation and location of the various structures of the eye, of foreign bodies or of pathological growths. The instrument, designed by Dr. Würdemann, is shaped much like a fountain pen and is manipulated in the same manner. In one end is a miniature, lens-capped electric lamp, which throws all the light forward through the tip of the in-

strument. A glass rod fills the space between the bulb and the end of the rubber tip which transmits the light undimmed and does not become heated for as much as ten minutes. While this method of examination reveals many otherwise unseen features of the cornea, iris, lens, aqueous and vitreous, it is in glaucoma that transillumination throws much light on the causes and changes present in this condition. It shows that in glaucoma the circumlental space is always smaller than normal, and is sometimes even obliterated. Anatomical conditions, such as a narrow circumlental space, predispose toward increased ocular tension and individuals of families who are prone to anterior glaucoma will most of them be found to have a narrow circumlental space. It is in these cases of anterior glaucoma that diaphanoscopy offers great aid in diagnosis. In posterior glaucoma the findings are negative. The diaphanoscope is far superior to focal and oblique illumination for examination of the surface of the cornea and in operating for removal of foreign bodies. A. F. A.

Vibratory Massage in Eye Diseases.

CONNOR, LEARTUS, Detroit, Mich. (*Ophthalmology*, July, 1908), draws the following conclusions from his experience with vibratory massage of the eye. To the pressure and varied movements of finger massage the vibratory adds a great variety of vibrations not only at the point of contact, but to all other parts and adjacent tissues, which arouses to more normal activity all cells concerned in either eye nutrition or the acts of seeing; it reduces ocular tension, accelerates intraocular circulation, clears the media, improves vision and promotes ocular comfort.

A. F. A.

An Illuminated Spud.

SNELL, A. C., Rochester, N. Y. (*Ophthalmology*, July, 1908), presents an instrument consisting of an hexagonal handle of about the usual size, into the end of which any spud or knife may be clamped, and a small electric lamp, attached to the handle, concentrates light for the point of the spud. It solves the difficulty of sufficient illumination

of the field of operation, is light in weight and well balanced, practically indestructible and may be sterilized.

A. F. A.

A Wire Lid-Elevator for the Prevention of Loss of Vitreous Humor in the Operation for Extraction of Cataract.

MORAWECK, ERNEST, Louisville, Ky. (*Ophthalmic Record*, May, 1908), describes his wire lid-elevator, which he says helps to reduce the danger of the loss of the vitreous humor in cataract operations. The size of this instrument is $5\frac{3}{8}$ inches long. The hook is of No. 14, and the finger-ring of No. 15, Browne & Sharpe gauge, tempered steel wire, nicked, all parts hard soldered.

During the operation the assistant lifts both elevators until they stand well out from the eye, so as to overcome spasms of the orbicularis muscle. The instrument is held in place until the operation and toilet of the eye are complete.

O. W.

Method of Illuminated Test-Type Charts with Artificial Light.

BLACK, NELSON M., Milwaukee (*Ophthalmic Record*, May, 1908), in an illustrated article on the method of illumination of test-type charts with artificial light, says that artificial illumination may be used either by reflection or transmission and that electricity is the most convenient means for this purpose.

In consequence of the wide difference of opinion on this subject in the United States, the writer sent out questions regarding the use of artificial light for illuminating test charts, and the efficiency of reflected and transmitted light. Of the many replies which he received, eighteen were in favor of reflected light; nine favored transmitted light; five used only daylight; three found no difference, and twenty-five had never used transmitted light.

Continuing, the writer says that there is more irradiation from a card illuminated by a reflected light than from a diffused transmitted light, and that light from translucent charts properly prepared, is easier on the eyes because it is properly diffused.

In the opinion of the writer, transmitted light is the best for illuminating test-type charts, and for this he gives several reasons.

The article is a very long one and cannot be reduced to an abstract without omitting much that is of interest.

O. W.

ABSTRACTS FROM ENGLISH OPHTHALMIC LITERATURE.

(GREAT BRITAIN AND THE ENGLISH COLONIES.)

BY

WALTER R. PARKER, M. D.,

DETROIT.

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The Operative Treatment of Optic Neuritis.

HORSLEY, SIR VICTOR (*The Ophthalmoscope*, September, 1908). The author first points out that optic neuritis is produced by a combination of factors, of which the only one we know to be certain is a rise of intracranial pressure. This intracranial pressure is the prime factor. Where toxemias are known to be present the effect of the toxins is not known. That the release of intracranial tension arrests and cures optic neuritis, as first pointed out by the author, has been confirmed by many. After describing his method of operating the author gives the differential diagnosis of the seat of the disease.

The operation is divided into three steps: (1) Opening the skull; (2) opening the dura mater; (3) tapping.

Opening the skull may afford a relief of pressure—the optic neuritis in the author's experience has "invariably simple opening of the skull" cases have been reported but it has not been found to meet them, and therefore the dura be invariably opened." The opening should be free 5 cm.

In speaking of tapping the lateral ventricle of the spinal cord by lumbar puncture, the subsidence of the neuritis is tentatively recommended either procedure, but the latter is a considerable in the skull and dura.

In speaking of the point of selection for the operation, the author says: "There are two places where the operation can be readily be approached, the cisterna which can readily be approached, but more important is the intrapeduncular cisterna of course, immediately beneath the trochlear nucleus. The procedure I advocate there is the making of a large oval opening in the dura mater (practically the removal of the dura mater) and the raising of the temporal lobe of the brain affords the most certain relief, and is spoken of as the operation of selective trephining.

But we have not considered the possibility that beneath the cerebellum. This can be approached by trephining the occipital bone, the aperture into the foramen magnum. In the dura, it is readily seen that the arachnoid is attached high up on the cerebellum and can be opened at once without difficulty.

It has been suggested that subarachnoid pressure is not so certain as the operation of trephining. Personally, I have not seen this naturally in view of the facts that the conditions associated with neuritis is not meningitis or leptomeningitis, it is not some adhesion and block around the aqueduct itself. Under such circumstances

gitis may be imperfect, but inasmuch as the vast majority of operations in this neighborhood have been for the removal of neoplasms I have not seen the persistence of neuritis that has been suggested. In recommending generally the temporal route, therefore, I cannot say that it is essential to open the skull thereby instead of by the occiput, but, as I said before, I would always prefer to do this in any case where it is impossible to locate the disease and attack it directly."

Few things are more striking after an operation for cerebral tumor than to see the rapidity with which the swelling and the degenerative changes of the disk and retina clear up. Certainly, this seems to occur with the same rapidity where the operation is performed above or below the tentorium.

Great importance is attributed to unilaterality in the degree of the optic neuritis, and to the early failure of vision in determining the situation of the tumor. The neuritis being most marked or older on the side of the lesion. The very important point is made, however, of calling attention to the fact that the amount of swelling at the time is not enough to determine the duration of the neuritis. The age of neuritis is the all-important thing and a careful study of the changes in the interstitial tissue of the disk as well as the amount of swelling must be considered. One portion only of the nerve may be involved. The author has seen less than the upper and inner quadrant of one field become the starting point of neuritis from the presence of a small tumor. Sir William Gowers has pointed out that the whole inner half of the disk was the seat of the beginning of neuritis in the majority of cases.

From the "juicy" stage the changes in the optic nerve may pass to the stages of "striation," "stippling," "dotting," "formation of white spots" and "shrinkage" until the atrophic stage is arrived at. An example of the bearing of the age of such changes is cited in a case published by Gowers thirteen years ago. The disk on the left side was subsiding into atrophy whereas on the opposite the disk was greatly swollen:

Operation is recommended even in cases of specific kind which treatment is expected to cure, in order that the in-

evitable injurious changes in the ne
lowed to begin.

In speaking of the possibility o
changes he says, "It is in the first pl
can be done for cases which exhib
and only bare perception of light.
and degrees of atrophic changes wh
which ultimately disappear with g
vision if the source of the neuritis be

The most striking example is se
of optic neuritis met with in slo
tumors. While "quite sure" that th
ritis is readily distinguishable from
of a previously highly-swollen condi
panying a rapidly-growing sarcoma
pheres, the author admits he has no
perience" to enable him to different

The atrophic condition caused by
is mentioned as a case in point; due
the direct strangulation of the optic
carotid arteries. The degree of atrop
the limits of possibility of relief by o
of atrophic changes should be classifi
ing to their exciting cause.

In conclusion the author advocat
even to people who must inevitably
and adds the following summary:

1. That all cases of optic neuritis
soon as possible by operative treatm
2. That such operative treatment, i
indications, should be opening of the
temporal or sub-tentorial region.
3. That the physician or surgeon in
be held to be responsible for consec
neuritis be not treated as soon as de

Calmette's Ophthalmology

STEPHENS, H. F. R., WOODCOCK, H.
H. C. (*British Medical Journal*, Mar
short articles upon the ophthalmo-react

their experiences, but set forth no new facts. [They show that we have not yet arrived at a definite idea of its correct application, as one of the writers speaks of applying it twice or even three times to the same patient, whereas previous writers have shown that the reaction will commonly occur upon the second application in non-tuberculous persons, and they also make it evident that we have not yet arrived at a definite determination of its value.—Ed.]

Also in a paper in the same journal, April 18, 1908, T. Harrison Butler gives his experiences and concludes that while he uses it in all doubtful cases of chorioiditis and iritis he regards it merely as a help in diagnosis and not as an infallible guide. It is not nearly so accurate as the injection of tuberculin, but is probably as useful an indicator as Widal's reaction in typhoid.

W. E. B.

Cystic Forms of Xanthlasma Palpebrarum.

HUTCHINSON, JONATHAN (*British Medical Journal*, April 25, 1908). These spots occur in adults or middle-aged persons who have usually accounted themselves bilious, being subject to sick headaches and other symptoms attributed to the liver. They are more common in dark complexioned persons. After middle age they cease to develop and may disappear. [This is the opposite of the impression which the *Reviewer* had gained.]

It is from attacks of temporary or even recurring pigmentation such as we see in some persons that the common xanthlasma patches take their origin. The patches result from the deposit of a fatty acid derived from the bile and are to be regarded as a late result. The gland structures and occasionally the papillae also may suffer. The sebaceous glands often are affected and the sudoriparous only with extreme rarity. In the sebaceous form the glands affected form globular pea-sized cysts stuffed with very firm sebum and surmounted mostly by a "black-head." They never increase beyond a certain size and never inflame. When small they may be numerous and may occur in almost confluent groups, but usually they are few in number and scattered. They are never attended by comedonous acne on the rest of the face. The sebum cannot be squeezed out readily unless a little incision be made. Almost always some small spots of xanthlasma will be found

near them. The sudoriparous form was first described by himself and has not even since been mentioned by other writers. The patient exhibited shows beneath her right inner canthus a little group of four or five confluent cysts which show no orifices and are so tense that they might almost be supposed to be solid. They are of the size of a swan-shot. On the eyelid of the other side in a similar position is a single cyst of the same character, but smaller in size. No wash-leather or xanthasma patches can be detected. The fluid in this form is clear and resembles sweat. All the various forms of xanthoma and xanthasma are allied and are caused by hypatic disorder, but they are very distinct from each other.

W. E. B.

Tumor of the Orbit Removed without Enucleation and without Loss of Sight.

APTHOMAS, G. A. (*British Medical Journal*, May 16, 1908). The tumor was removed by slitting the outer canthus, cutting external rectus and then gradually dissecting it out from its position in close contact with the sheath of the optic nerve extending to the apex of the orbit. The vision which was reduced to light perception improved and three years after operation was 6/12. The tumor had the structure of a cavernous angioma.

W. E. B.

On So-called Rheumatic Iritis.

HIGGINS, C. (*The Lancet*, April 25, 1908). He believes that very many of the cases of iritis, called rheumatic, are instead due to gonorrhea and that the worst cases with few exceptions have this origin. The patient, usually a man, generally over thirty, will ordinarily give a history of gonorrhea, though it may have been some years previously and he may or may not have had gonorrheal rheumatism. The iritis is severe. Its chief distinguishing features are: pain, often very severe, swelling of the iris, much photophobia, strong tendency for adhesions to form, though not much exudate much ciliary and conjunctival congestion, decided inclination to contraction of the pupil which strongly resists mydriatic which there is often a marked intolerance, tendency increased tension, general intractability and an unim-

capacity for recurrences, continuing through any number of years. He has never seen a case which he could with certainty say was gonorrheal iritis in a female. He believes that in many men who have had gonorrhea there is left for years in some part of the urino-genital apparatus a very much attenuated virus which gives no trouble locally, but from time to time becomes very active and though setting up no local irritation is capable after absorption of causing inflammation in synovial membranes or in the iris. The treatment is unsatisfactory and there is no specific in this gonorrheal form.

W. E. B.

Ophthalmia Neonatorum: An Experiment in Treatment.

WALKER, A. N. (*The Lancet*, May 2, 1908). His experiment was based upon the desirability of admitting cases occurring among the poor as soon as possible after the beginning of the disease into an ophthalmic hospital where vigorous treatment can be properly carried out by skilled physicians and nurses both day and night. A special ward has been set aside for the purpose with its special nurse, and as soon as the authorities are notified of a case the mother with the baby is conveyed by ambulance to the hospital, so that the mother can nurse the baby while it is receiving treatment. He hopes also to use this ward for instruction purposes, both for students and also for midwives. [It is hoped that in this country also some more rigid law will be more universally adopted and rigidly enforced in regard to ophthalmia neonatorum occurring in the practice of midwives. Its need is urgent.—Ed.]

W. E. B.

The Treatment of Trachomatous Dacryocystitis.

BUTLER, T. HARRISON (*The Lancet*, May 2, 1908). The average Arab's or Oriental Jew's eye will tolerate more intra-ocular manipulation than will the Western's eye. Post-operative ocular iritis is never seen in Jerusalem if even reasonable cleanliness be observed. With regard to the lacrimal apparatus conditions are reversed. Treatment which may in England be adopted with impunity may in the East lead to disaster. In Jerusalem simple syringing of the sac may lead

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to serious complication, even orbit and blindness. These sacs are of sac walls so fragile that they are hydrostatic pressure and readily torn however skillfully passed, so that it be rapidly cured by lavage and we the sac should be extirpated.

The Disseminated Sclerosis Comp Vision.

WILLIAMSON, R. T. (*The Lancet* writer speaks of the disseminated failure of vision in one or both eyes the disease, while other symptoms are very slight for a long period, even no chief diagnostic value in the early stage; (1) the bilateral visual failure with central scotomata; (2) the Babinski type of planar defects; (3) the irregular and shaky writing, even when the tremor is so slight as to be detected; (4) the age of the patient; (5) the absence of any cause for the affection; (6) the absence of pain and tenderness of the knee jerks and pupillary reflexes; (7) the absence of any other disease; (8) the absence of any other disease; (9) the absence of any other disease; (10) the absence of any other disease. In many cases the defect has become marked there is almost complete recovery of vision. In some cases the defect remains more or less stationary to complete blindness. The course is chronic—often from ten to twenty years; (11) the absence of any other disease; (12) the absence of any other disease; (13) the absence of any other disease; (14) the absence of any other disease; (15) the absence of any other disease; (16) the absence of any other disease; (17) the absence of any other disease; (18) the absence of any other disease; (19) the absence of any other disease; (20) the absence of any other disease. Remissions of loss of vision occasionally there is apparent recovery.

A Method of Suturing the Lateral Rectus Muscle to the Stump after Enucleation

CLARKE, ERNEST (*The Lancet*, May 1909) is as follows: The conjunctiva is sutured to the sclero-corneal margin and freely separated from the sclera. The two lateral recti are hooked up

from their attachments, clamped with Prince's forceps and divided close to the eyeball. The other muscles are divided in the usual way and the eye removed as clean as possible. One of the lateral recti is then sutured with catgut to the lower lip of the conjunctival opening on the opposite and the other rectus to the upper lip of the conjunctival opening on its opposite side. A thick silk suture is passed through the margin of the conjunctival opening in the center and not tied, but simply twisted. This will keep the lips of the conjunctiva in apposition and at the same time will allow the egress of any blood which may accumulate within. A pad should be very firmly applied.

W. E. B.

On a Little Known Type of Amblyopia in Children.

STEPHENSON, SYDNEY (*British Medical Journal*, July 18, 1908). The author refers to cases of "post papillitic" or post neuritic atrophy, in which the atrophic changes are not complete. They are always bilateral, but sometimes more pronounced in one eye than in the other. Often a history of a "cerebral" or "meningitis" illness is given, marked by such symptoms as "fits," convulsions, headache, vomiting, constipation, retraction of the head, temporary paralysis, squint, unconsciousness, etc. On recovery the sight was discovered to be partially or totally gone, but has since been more or less regained. The conclusion is almost certain that the patient had an optic papillitis with his meningitis or encephalitis with the atrophic changes as a sequel. This type of cases must be distinguished from two other kinds of temporary blindness which may occasionally arise under somewhat similar conditions, "fleeting amaurosis" described by the author and "post-eclampsic amaurosis" described by Dr. Henry Ashby. The former is met with in children suffering with basal meningitis. The sight is wholly lost without ophthalmoscopic signs. Sometimes vision is regained. It was to this class of cases that Dr. William Gay proposed the name "Acute Cerebral Amaurosis of Infancy." The second class is somewhat similar to the first but the cause appears to be convulsions, lasting for some hours, days or weeks. When the child regains consciousness, he is found to be blind without ophthalmoscopic signs, may be associated with aphasia and hemiplegia. While admitting the possible objection that convulsions are merely complica-

tions of many pathological states, it is insisted that they are the cause of amaurosis, and the suggestion is offered that the nerve storms might involve the visual cortical centers as well as the Rolandic motor centers, or the speech center, and the period of discharge be followed by a period of exhaustion.

The different forms of blindness here mentioned can be established only by ophthalmoscopic examination. In acute cerebral amaurosis, and in post-epileptic cases the optic disks show no changes, whereas in the other class they exhibit atrophic changes.

The histories of six cases are added illustrative of the forms of amaurosis mentioned in the paper. W. R. P.

A Case of Partial Ptosis with Exaggerated Involuntary Movement of the Affected Eye-lid: The "Jaw-Winking" Phenomenon.

SYM, WILLIAM GEORGE (*Ophthalmic Review*, July, 1908). The patient, a young woman, aged 30, complained of partial ptosis on the left side, and at times the left upper lid executed involuntary and "ridiculous" movements.

Examination revealed a distinct ptosis of the left upper lid, the levator was not paralyzed. Movements of globe perfect. When the patient was chewing her food or when singing, the left upper lid moved upward, disclosing perhaps as much as 3 mm. of white sclerotic above the corneo-scleral junction. It was this of which the patient complained. So marked was it that the patient hesitated to eat or sing before strangers.

Together with Dr. Alexander Bruce the case was investigated. There was very distinct elevation of the eyelid on use of the left external pterygoid muscle (moving the jaw to the right), "a sort of exaggerated twittering of the eyelid up and down." When she opened her mouth by actually depressing the lower jaw, the lid sprang up in a manner described above. There was no exophthalmos, pupils were equal and vision good. When the lid flew up there was no corresponding movement of the right upper lid, no corrugation of the forehead, nor movement of the eye itself. Nor was there any evidence to show any affection of the sympathetic. The condition was congenital and had not changed. The patient was unaware of the movement of the lid, it was the obvious unpleasant facial contortion which had brought her to the author.

The first case of this kind was described by Marcus Gunn in 1883 and since then some 20 to 30 cases have been noticed. The lid movement in Mr. Gunn's case came on with lateral movement of the jaw, rather than with vertical opening of the mouth, as in this case. The committee appointed by the Ophthalmological Society after investigating this case concluded that probably the levator was innervated partly from the muscles of the third nerve and partly from the external pterygoid portion of the nucleus of the fifth nerve, and that there was an abnormal connection between the two.

The author quotes from a paper by Sinclair of Ipswich (*Ophthalmic Review*, October, 1895), who divides the cases collected into three series. The first consists of those in which certain movements of the lower jaw are associated with an upward movement of the lid.

The first series is divided into three groups: 1. Either lateral movement or wide opening of the mouth brings on the elevation of the eyebrow. 2. Depression of the lower jaw alone brings on the elevation. 3. Lateral movements of the jaw alone, as in the process of chewing, sets up the contraction. The second and third series were not considered. In 25 cases the right eye was affected but seven times.

The author does not believe that the movement is simply reflex, as in the case of children who open their mouth when they attempt to open their eyes widely, and calls attention to the argument of Sinclair that lateral movements of the jaw only may produce the symptom, that it is onesided; and that in the case of the children spoken of the attempt to elevate the lid is carried on by the frontalis. He thinks with the committee who reported on Gunn's case that the levator receives nerve impulses both from III and V nerves. Helfreich suggested that the abnormal fibers might come from the facial. While this might be true in some cases, ptosis is not invariably present.

A paper by Harman, who endeavors to explain the association of the lid movement along with jaw movement "not as a 'freak,' but as a revival of an old-time and long-accustomed associated movement," is mentioned only to say his conclusions are not convincing.

In conclusion the author states that the only explanation seems to be the occurrence in some inexplicable way of confusion in the joining of the fibers and cells belonging to the

fifth and third nuclei, so that the levator palpebrae superioris has normal innervation, and there is therefore no ptosis, but no paralysis of the muscle. The levator receives some fibers which come from the external pterygoid or the digastric, and when put in action the levator is unimpeded, producing the curious effect described.

Foreign Bodies in the Eye

RIDLEY, N. C. (*Ophthalmic Review*) reports two unusual cases of foreign bodies in the eye. In the first case a piece of dead wood, covered with bark, measuring an inch long and about a quarter of an inch in diameter, was found in the eye of a piece of wood one and a half inch in circumference.

The first extended through the upper eyelid just below the inner canthus and remained for several weeks. The vision was normal and was not seriously interfered with.

The second entered through a wound in the lower eyelid, the eye was extremely proptosed and the lids swollen. On the ninth day the vision was normal and movements were but slightly impaired.

ABSTRACTS FROM GERMAN OPHTHALMIC LITERATURE.

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Mikulicz's Disease With Manifest Tuberculous Iritis.

KRAILSHEIMER, Stuttgart (*Die ophth. Klinik.*, No. 15, 1907). According to Kümmel the disease comprises a uniform enlargement of the various cephalic glands of the salivary type. It is slowly progressive, unassociated with severe constitutional manifestations and generally occurs in middle life.

The causal agent probably enters the gland ducts from the mucosa. Mikulicz attributed it to an infectious or parasitic process in the broadest sense of the term. The supposed virus leads to the formation of lymphadenoid tissue and frequently to typical lymph follicles in the interacinous connective tissue. The latter undergo hyaline degeneration and the gland tissue is destroyed early (Kümmel.)

ABSTRACTS, GERMAN OPHTH

Microscopical studies by Arnold and Mikulicz respecting the lacrimal and salivary glands gave the same results. The pathological changes were those that produced by tuberculosis. Mikulicz included under the disease the lacrimal glands. The buccal salivary glands were also affected with associated lymph gland changes.

In the differential diagnosis, malignant lymphoma, leukaemia, lymphosarcoma and lymphoma are considered.

The prognosis is usually favorable. Inflammation of the lacrimal gland may give rise to many disturbances.

Arsenic, KI, syrup of the iodine preparations are of service. Excision is necessary, recurrences being rare after complete extirpation.

The author then reported a case of Mikulicz's disease, in which ocular symptoms were absent. The usual symmetrical enlargement of the salivary glands was present. The disease was apparently without symptoms. Later on there was a dryness of mouth and eyes, and finally a double-sided iritis (diagnosed as Mikulicz's disease), characterized by precipitation on the cornea, posterior synechiae and iris atrophy.

Histological examination of the lacrimal gland revealed many tubercles in the connective tissue stroma and gland tissue. The tubercles were small and numerous.

Whether this case should be connected with the etiology of Mikulicz's disease or whether an adenoid condition predisposed to the disease, he leaves an open question to be decided by further investigations.

Cutaneous and Ophthalmo-Tuberculosis

· MAININI, Munich (*Muench. med. Wochenschr.* 1907, No. 52). He summarizes the observations as follows:

1. The cutaneous as well as the ophthalmo-tuberculin test produces in certain tuberculosis (excepting very advanced cases) a positive local reaction with great consistency.

2. The absolute specificity of this reaction has as yet not been proven.

3. In non-tuberculous cases the cutaneous reaction occurred six times oftener than the ocular reaction.

4. Presupposing the reaction to be a specific one, these results perhaps mean that the ocular reaction is particularly indicative of acute tuberculosis; the V. Pirquet reaction in addition revealing latent tuberculous foci.

A. C. S.

Report on 350 Lacrimal Sac Extirpations, With Remarks on Indication and Technique.

BAEUMLER, Dresden (*Muench. med. Woch.*, March 19, 1907). In 29,509 eye patients he observed *epiphora*—onesided, 722 cases; doublesided, 566 cases. *Dacryocystoblenorrhoea* (including ectasia of sac—onesided, 592 (16 congenital); doublesided, 127. *Acute dacryocystitis* (with and without perforation) onesided, 207; doublesided, 6. *Onesided chronic fistulous formation*, 47 cases. The graver forms followed or were complicated with periosteal gumma, 3 cases; epithelioma of the inner canthus, 1 case; sarcoma of the orbital rim, 1 case; lupus, tuberculosis, trachoma, several cases. Three hundred and fifty extirpations were performed, 96 on male, 254 on female patients, with three recurrences.

The author starts his incision 1 cm. above the middle of the internal canthal ligament and directs it obliquely down and temporally for about $2\frac{1}{4}$ cm. He employs a Mueller's speculum. He especially tries to avoid injuring the periosteum and considers it of importance to dissect the sac thoroughly from the canaliculi. Hemorrhage is controlled by sponge compresses. In one case the hemorrhage was so profuse that the operation had to be performed in two stages. He permits his patients to decide between a general anesthetic and local anethesia by Schleich's method.

He draws the following conclusions:

1. That extirpation is indicated in all cases where the

globe is threatened, where other measures have failed, or where a cure by conservative methods is probably out of the question.

2. The customary operative steps should be followed; the adjoining tissues, in particular the periosteum, should not, however, be damaged.

3. The post-operative treatment may be an ambulatory one in most cases. A. C. S.

The Pressure Bandage in the Therapy of Detachment of the Retina.

FREYTAG, G., Munich (*Muench. med. Woch.*, August 27, 1907). The theory that the pressure bandage by increasing intra-ocular tension favors retinal reattachment lacks the support of physical laws.

Increase of tension does occur, but it concerns equally the sub- and pre-retinal fluids. The detached retina, therefore, remains stationary.

It favors effusion of intra-ocular fluids, but this occurs in equal proportion from both sub- and pre-retinal spaces. Moreover, it subjects the eye to dangerous consequences, because of tension variations resulting from changing or removing the bandage. Corneal complications sometimes ensue and the bandage is more or less burdensome to the patient.

The value or inefficacy of the pressure bandage can only be proven statistically when in a large series of cases it is the only measure resorted to. A. C. S.

Experiences With Behring's Tulase Preparations in the Treatment of Tuberculous Ocular Affections.

COLLIN, R., Berlin (*Muench. med. Woch.*, September 3, 1907). In his preliminary remarks he speaks of the methods Behring employed in the preparation of these products.

Tulaselaktin is supposed to furnish an active immunity; antitulase, a form of passive immunity, the latter preparation being obtained from horses after immunization by tulaselaktin. Tulaselaktin apparently acts favorably only on local tuberculosis.

Collin treated 25 cases of ocular tuberculosis at the University Eye Clinic of v. Michel, Berlin, 12 with tulaselaktin, 13 with antitulasase, 6 with both preparations.

The injections were made subcutaneously below the angle of the scapulae. He began with 1/100 mg. of tulaselaktin and doubled the dose each succeeding day until he reached a dosage of 8 mg., a treatment thus lasting 10 days. If there was much general or local reaction the treatment was followed by a 20-day interval of rest, the duration of this period, however, depending considerably on the severity of the symptoms.

The initial dose of antitulasase was 100 mg., the dosage being doubled daily until a dosage of 2000 mg. was reached. One treatment generally sufficed.

The cases treated with tulaselaktin generally caused a constitutional response, whereas in those subjected to antitulasase the local manifestations overbalanced the general reaction. While the temperature often rose after injecting smaller doses of tulaselaktin, this rise was often absent after large doses. The general reaction seemed to be much less severe than after tuberculin injections and a gain in weight was often observed.

Antitulasase led to marked local reaction in fresh tuberculous cases; in more chronic cases the effect was not so intense; probably on account of fibrous encapsulation. The reaction was never dangerously severe. The amount of tulasase necessary to produce reaction varied with the individual.

Regarding results, the author thinks that those cases which gave a positive general or local response, regressed more speedily under the treatment than cases ordinarily under the usual forms of treatment.

In conjunctival tuberculosis, the treatment was of no avail.

The favorable results obtained in a few cases of chronic ocular tuberculosis (iridocyclitis, parenchymatous keratitis) associated with constitutional tuberculosis, by means of the combined treatment have made the writer decide to always use this method in the future.

One treatment of antitulasase is administered to effect specific local reaction. After healing of the tuberculous

focus, the 10-day method of treatment with tulaselaktin is begun.
A. C. S.

Temporary Edema of the Optic Disk of One Eye, a Localization of Acute Circumscribed Edema (Quincke).

HANDWERCK, Munich (*Muench. med. Woch.*, November 19, 1907, No. 47). Handwerck reports a case of acute angio-neurotic edema in a woman 73 years old, complicated with an edema of the optic disk. There had been attacks of edema involving the neck, chin, lip, supra-orbital region and tongue. The attacks generally followed intestinal derangement, were always of brief duration and without severe subjective manifestations.

A few days after the subsidence of an edema of the left side of the tongue the patient suddenly began to be troubled with peculiar visual sensations; it seemed to her as if white leaves were falling to the ground. The phenomenon was only present in the right visual field. The next day these sensations appeared as dark club-shaped figures; there were scintillations and the whole field seemed misty.

Ocular examination made by Schneider revealed edema and moderate swelling (2D) of the nerve head. There was apparently no marked reduction in vision or contraction of the field of vision.

Within 2½ weeks the fundus was normal. The author was unable to find a similar case in literature. He attributed the ocular condition to an acute circumscribed edema of the nerve or nerve sheath.

The longer duration of the ocular signs he ascribed to circulatory disturbances affecting a very delicate structure, secondly to the anatomical relations of the nerve fibers at their entrance through the lamina cribrosa. A. C. S.

Concerning Malignant Ophthalmia Neonatorum.

NAUMANN, Dresden (*Wiener klin. Woch.*, December 12, 1907, No. 50). Naumann reports a case in which immediately after birth there was conjunctival swelling with moderate purulent secretion. Seven hours later both corneas were involved. Perforation followed with the expulsion of both lenses.

The mother was probably infected two weeks before the birth of the child.

Early involvement of the conjunctiva was no doubt favored by a rupture of the fetal membranes two days before delivery.

Krukenberg, Keller, Runge and Hirschberg, have reported similar cases in all of which early rupture of the membranes occurred . A. C. S.

Concerning Lacrimal Sac Prothesis.

ZIMMERMANN, W., Görlitz (*Die ophth. Klinik.*, No. 18, 1907). To forestall the troublesome epiphora consecutive to the extirpation of the sac, the author recommends the introduction of a silver lacrimal sac prothesis. Contrary to expectations, no obstructive granulations were observed in a case where the prothesis was removed eight weeks later on account of a sinus complication.

The procedure was tried in four other cases; the two which he exhibited were operated on about 3½ months before. There was generally only slight conjunctival reaction, and drainage into the nose occurred from the beginning. He starts his incision 3-5 mm. above the crista and cuts down to the bone. The periosteum is scraped away downward until the fossa lacrimalis is reached, thereby following the posterior surface of the sac. An assistant then pulls the sac and adjacent tissue towards the nose while the operator seizes the outer skin covering and dissects it from the sac.

After excision and brief tamponade, the prothesis is introduced. A firm pressure bandage is necessary. Stitches are removed on the fifth day.

In one of the patients he demonstrated the patency of the whole drainage tract by irrigating through the lower canaliculus, in two others only the patency of the canaliculi was demonstrable. The ordinary extirpation operation is always followed by obliteration of the canaliculi.

The prothesis operation is indicated in cases of chronic dacryocystitis when the sac has been removed in toto and no buttonholing of the skin has occurred, cases uncomplicated with ethmoidal complications or complete obliteration of the naso-lacrimal canal. A. C. S.

Recent Investigations Concerning the Diagnostic Importance of Pupillary Symptoms.

BUMKE, Freiberg (*Muench. med. Woch.*, November 19, 1907, No. 47). Bumke believes that the Argyll-Robertson pupil generally signifies a metasyphilitic affection (tabes, parietic dementia), but that rare cases occur in which the symptom follows in the wake of a syphilitic infection without being associated with other signs of tabes or parietic dementia (Binswanger, Siemerling). Even in these cases, however, it is impossible to deny the existence of a specific systemic infection.

The reason for not finding the Argyll-Robertson pupil, perhaps, as frequently in these diseases as former years, must be attributed to the more exact pupillary tests in vogue at the present time. Such tests often cause the first stages of the phenomenon to pass unrecognized.

The author's method of examination is based on the fact that weak galvanic current (.02-.2 milliamperes) conducted through the eye of a normal person, at the moment of anodal closing will produce a light sensation. Stronger currents (.04-.5 milliamperes) will, in addition, effect a pupillary reaction (direct and consensual) so slight that it can only be seen with magnifying lenses.

In only 13 per cent of cases of general paresis could a pupillary response be induced by currents less than 3 milliamperes; in 87 per cent there was no galvanic reaction.

Because cases of parietic dementia exhibiting the Argyll-Robertson symptom were later found to be associated with degeneration of the posterior columns, some authors consider the symptom really of a tabetic origin, but the writer and others found posterior column degeneration in nearly all the cases of parietic dementia they examined.

In the diagnosis he considers inequality of the pupils not as significant as changes in the shape of the pupil. Absolute pupillary inaction is of course more characteristic of parietic dementia and syphilis of the nervous system. The absence of reflex sensory dilatation and the atrophy of the iris stroma are chiefly of theoretical interest. He then briefly discusses the pupillary signs of alcoholism, symptoms generally resulting from nuclear lesions.

Functional Neuroses.—In a large percentage (60%) of cases of dementia praecox under which he includes the older descriptions of hebephrenia and katatonia, sensory and psychical pupillary dilatation and pupillary unrest were found absent. Unfortunately, these symptoms do not present themselves until the disease is well advanced.

In both the epileptic and hysterical seizure there may be absolute pupillary paralysis, the pupil being of variable size. Elliptical pupils rather suggest hysteria or katatonia. According to Wilbrand and Saenger, even in these instances of pupillary inaction, a minimum response to light can always be elicited.

In conclusion, he refers to sympathetic paralysis, believing it to be the only ocular symptom due to a cervical cord lesion, and that all views attributing the Argyll-Robertson pupil to a spinal lesion as open to criticism.

A. C. S.

The Ocular Inflammations of the New Born.

SCHANZ, Dresden (*Muench. med. Woch.*, November 19, 1907, No. 47). Schanz considers a statement made by Greeff in a discourse on ophthalmia neonatorum at the Charité, Berlin, as very daring. Greeff expressed the opinion that eye inflammations of the new-born in which gonococci are not found, are harmless and unless irritated by unnecessary caustics, will disappear in a few days.

Schanz has encountered grave instances of blenorhea where repeated examinations failed to reveal the gonococcus, also mild cases when the organism was readily found. Others report similar findings. In the treatment he is entirely governed by the clinical picture. He thinks the bacteriological diagnosis is not so easy as Greeff intimates, there being many other Gram negative diplococci closely resembling the gonococcus. He then presents his views on the bacteriology of the affection.

The writer also censures Greeff for saying that timely treatment will always result in a cure without complications. This has certainly not been Schanz's experience in premature and atrophic infants, or in cases where the hygienic conditions were not of the best. Such a statement from an authority may seriously endanger a physician's case in suits for malpractice.

In conclusion he refers to the Credé treatment; saying he has seen five eyes damaged by accidental instillation of 10 per cent silver nitrate solution instead of a 1 per cent solution.

Weaker medicaments he thinks ought to be just as efficient.
A. C. S.

A New Treatment of Gonorrheal Ophthalmia by Means of Bleno-Lenicet Ointment.

ADAM, Berlin (*Muench. med. Woch.*, October 22, 1907, No. 43, Abstract in *Die ophth. Klinik.*, November 5, 1907, No. 21). The treatment consists in the treatment of bleno-lenicet ointment into the conjunctival cul-de-sac.

The ointment is composed of lenicet (a polymerized finely divided acetate of aluminum preparation) and euvaseline, a vaseline, the melting point of which is raised by the addition of ceresin. The euvaseline forms a protective covering of the cornea of at least two hours' duration, while the lenicet produces both a coagulation and marked diminution of secretion.

In twelve cases of gonorrheal ophthalmia he reports nine recoveries without corneal complications, two where vision was reduced one-third, and one case in which a perforating ulcer occurred, reducing vision to counting fingers in three meters. The treatment in detail is as follows:

1. After everting the upper lid, 10 per cent bleno-lenicet ointment (about the size of a bean) is introduced every two hours day and night. The secretion visible externally is wiped away with moist cotton pledgets.

If, as generally happens, the secretion has appreciably decreased at the end of 3-4 days,

2. Five per cent bleno-lenicet ointment is employed, 3-4 times in the 24 hours or oftener. If, at the end of 14 days or so, the purulent secretion has completely ceased,

3. Pure euvaseline is introduced and one drop of a 1/4 per cent silver nitrate solution instilled once daily.

4. After the eye has become quiet, zinc vaseline (1/2 per cent).

A. C. S.

On An Operative Procedure in the Treatment of Detachment of the Retina.

SACHS, Vienna (*Wiener klin. Woch.*, October 24, 1907, No. 42). The author is of the opinion that the scleral punctures as usually performed merely lead to adhesions near the ora serrata to which the retina is already attached. He therefore favors incising the sclera behind the equator. The formation of subretinal fluid occurring at the extreme periphery in the great majority of cases, the production of adhesions in the posterior half of the eyeball will act as a barrier to the further progression of the undermining fluid. Ophthalmoscopic examination in one case established this point without a doubt.

In six cases of retinal detachment, three of which were complicated with myopia, he made his incision with a sickle-shaped knife behind and parallel to the equator. Several operations were generally necessary, the incision in each succeeding operation generally being made posterior to the preceding incision.

In the first case (the fellow eye being blind) he severed the superior rectus and at the second attempt the internal rectus at their respective scleral attachments, the muscles being again sutured to the globe after puncture and escape of the subretinal fluid.

In only one case (a very old detachment) was the operation successful. He concedes that the time has been too short to enable him to draw any conclusions as to the permanency of results. The second attempt in his first case was made only four weeks before, his last cases being only several days old.

He believes the operation indicated in fresh cases or in older cases where no marked folding of the retina has occurred.

A. C. S.

Further Remarks on Lacrimal Sac Prothesis.

ZIMMERMANN, Görlitz (*Die ophthalm. Klinik.*, December 20, 1907, No. 24). Zimmermann reports seven additional cases of dacryocystitis operated on within the past few months in which lacrimal protheses were used. In all but one the prothesis healed in without difficulty and epiphora practically disappeared.

While he believes it still too soon to make statements regarding final results, he is satisfied and believes the prosthesis will be successful. Previous failures referred to by H. K. at the Dresden Congress, 1907, Zimmermann's antiseptic operative methods.

The prosthesis is manufactured and made in four sizes. The tube ends in the canal, the spoon-shaped upper extremity in the fossa for the lacrimal sac. If the prosthesis is accurately adjusted no displacement occurs after subsequent suturing and tamponade. In the first three reported cases have been successful.

In one of the second series the prosthesis was lodged and had to be removed. Following hypertrophied lower turbinate resection brought about a cure.

Extirpation of the Gasserian Ganglion in Neuroparalytica infantilis

WEISS, K. E., Gmünd (*Die ophthalmologische Praxis*, 1907). Weiss reports a case where the Gasserian ganglion had been perforated previously. The cornea, although corneal, remained clear. Symptoms of sympathetic ophthalmia also present.

This and the many other cases where the Gasserian ganglion not followed Magendie's trophic nerve theory, the disease is due to the trophic disturbance of the trophic fibers in the fifth nerve. The so-called trophic fibers do not run in the geminus, but are to be found in the nerve plexuses which join the nerve more peripherally, apparently explaining those cases where the Gasserian ganglion not followed.

Berger and Löwy believe the trophic fibers run in the orbit by way of the carotid and ciliary nerves, joining the Gasserian or ciliary ganglion. These theories stands the above-mentioned.

tirpation had been done, where the sympathetic had also evidently been involved, but without resulting in keratitis neuroparalytica.

The author therefore holds to the view of Snellen, which ascribes the affection to slight trauma, followed by infection, or to dessication (Feuer), the latter being especially liable to occur in double-sided fifth nerve paralysis.

He concludes that there is practically no danger of keratitis after unilateral extirpation. Apparently the eyes are particularly subject to disease the first days after the operation. Opinions differ as to the necessity of applying a protective dressing.

A. C. S.

The Diagnostic Value of the Ophthalmic Reaction in Tuberculosis.

SCHENCK-SEIFFERT, Frankfurt a/M. (*Muench. med. Woch.*, November 12, 1907, No. 46). The writers tested the reaction in 100 cases. The method employed was as follows: One drop of a 1 per cent old tuberculin in 3 per cent of boric acid solution was instilled in the right eye; no reaction occurring, one drop of a 2 per cent solution was instilled; still no reaction being produced, one drop of a 4 per cent solution was added.

In order to eliminate possible chemical reaction from over accumulation of tuberculin, instillation in about one-half of the cases was at first made in the right eye and then in the left eye.

An eye examination was made every five or six hours, and at still shorter intervals during the early stages of ocular reaction. The solution was freshly prepared every two or three days.

Among the 100 cases were 28 cases of tuberculosis (Class I), 20 suggestive cases (Class II), and 52 clinically non-tuberculous cases (Class III).

ABSTRACTS, GERMAN OPHTH

The results in each case are p
prehensive idea may be obtained

	Reaction p		
	Total	1% T.B.	2% T.B.
Class I.	96.4%	78.57	14.30
Class II.	75.0%	30.00	30.00
Class III.	50.0%	5.77	21.15

The reaction consisted of a mor
tival inflammation appearing in
hours after instillation; there wa
caruncle and of the palpebral c
the lower fornix. The reaction r
in 24-36 hours.

In the tuberculous cases a typ
with the usual subjective sympto
were therapeutic measures neces
rule, subsiding within two or th

The authors believe that the
soon be considered of great valu
cipient tuberculosis. The simpli
freedom from harmful consequ
others to make further investigati

On Orbital Inj

BOEHM, Heilbronn (*Die ophth.*
No. 20). After a brief general d
juries Böhm reports a case in whi
4½ cm. long was retained in the o
years no symptoms were noted, t
ing of the bulbar conjunctiva and
granulation beneath the caruncle
jury) occurred.

There was nothing suggestive of
ulation tissue was accordingly exc
ment instituted.

When the patient again presented himself at the end of three years, the former symptoms were again in evidence, and now a history of traumatism was elicited.

X-rays located a foreign body in the superior maxilla, but operation revealed the same on the floor of the orbit. Extraction was not difficult, and the patient made a good recovery.

A. C. S.

Paraffin Oil Mercuric Iodide Mixture.

FERENTINOS, Patras-Greece (*Die ophth. Klinik*, No. 18, 1907). The author, who was the first to introduce and to employ this mixture in the treatment of external eye conditions, finds much to recommend it. He mixes 1 gram of mercuric iodide with 1000 gr. of paraffin oil; one part of this mixture being again mixed with three parts of vaseline oil or vaseline salve. A mixture results which is non-irritating, but distinctly bactericidal, the oil itself not only being antiseptic but very diffusible, capable of penetrating diseased tissues and thus carrying the suspended mercuric iodide along with it.

He finds it efficacious in many external eye diseases, even in chronic catarrh, also in cases for which one would usually prescribe an ointment.

In acute inflammatory conditions he flushes the conjunctiva with some watery solution and then instils a few drops of the oil.

Even in *ulcus serpens*, trachomatous ulcers and gonorrheal conjunctivitis the mixture acts favorably, though, of course, it must be used in conjunction with other remedies (atropin, silver nitrate, etc.).

A. C. S.

(The writer made instillations of the above mixtures in his own eye and found that while immediately after instillation there were no subjective or objective symptoms, at the end of two or three hours lachrimation and conjunctival redness ensued, associated with a dull, rather annoying, ocular ache.

A. C. S.

Concerning Hydroa Vacciniforme and Vernal Catarrh.

KREIBICH, Prague (*Wiener klinisch. Woch.*, October 17, 1907, No. 42). He describes hydroa vacciniforme as

ABSTRACTS, GERMAN OPHTH

characterizing itself by an eruptive vesicles, much like those of variola. Associated manifestations, resembling those of urticaria, rose-colored nodules, whose center is surrounded by a dry, adherent scab. He considered the disease as a carcinoma gangrenosa and etiologically connected with the nervous system. The disease resembles summer prurigo, a somewhat similar affection, chronic scratch eczema, a vesicle forming on the most prominent part of the face. Etiologically, both are primarily due to the solar rays.

Not only in summer prurigo, but also in the vernal catarrh of the eye, the same form has vernal catarrh been found in other cutaneous affections and of vernal catarrh of the eye. The association of the latter with the former can hardly be considered accidental; but points to a common cause, namely, to the sun's rays.

While the cutaneous disturbance is the more common, the ocular signs represent a construction, a more pure form of the disease.

He believes vernal catarrh of the eye to be a xeroderma pigmentosum, a disease due to the solar rays.

Iris Tumor Existing for T

GROENOUW, Breslau (*Centralblatt für Chirurgie*, April, 1908, Vol. xxxii, page 101) reported a tumor of the iris, 6 mm. in diameter, of a brown color, lying in the inferior part of the iris, had been observed for 22 years, but only noticed up to five years ago, when the eye became inflamed without inflammatory symptoms, but the patient refused an operation. Considered the tumor as a melanosarcoma of very malignant character, which only in recent years had become malignant.

Wandering of the Pigment in a Tattooed Leucoma.

STEINER, L., Surabaya, Japan (*Centralbl. f. prakt. Augenheilk.*, April, 1908, Vol. xxxii, p. 104). Steiner had a patient with a leucoma from a gonorrheal infection, which he tattooed in three sittings, so that at some distance it could not be distinguished from its surroundings. For about one week the eye was irritated. During this period, however, a slight prominence formed on the lower left half of the leucoma, around which the pigment tended to collect in an irregular areola. Simultaneously, the rest of the leucoma lost its pigment. About one month after the first operation, a second was performed, where the good result was permanent. Steiner believes that there was a leucocytosis during the period of irritation, and that the leucocytes carried away the pigment granules. C. L.

The Instillation of Fibrolysin in the Conjunctival Sac.

WINDMUELLER (*Mediz. Klinik*, No. 9, 1908, Abstract in *Wochensch. f. Ther. u. Hyg. d. Auges*, April 23, 1908, Vol. xi, page 234). Windmüller first drops a 2 to 10 per cent solution of dionin into the conjunctival sac in order to increase the absorptive power of the eye, and when it has acted, uses the fibrolysin. This can be done 1-3 times daily, and for weeks at a time. There is some pain at first, but this quickly passes away. The best results were in cases of corneal scars, where increase of vision and improvement of the cosmetic appearance was noted

C. L.

**Removal of the Orbital Lacrimal Gland After Previous
Removal of the Lacrimal Sac and Palpebral
Lacrimal Gland.**

GROENOUW, Breslau (*Centralblatt. f. prakt. Augenheilk.*, April, 1908, Vol xxxii, page 100). Groenouw reports a case of epiphora of over 20 years standing. Four years ago the sac was extirpated on account of dacryocystoblenorrhoea, with resulting increase in the epiphora. Six months later, to cure this, the inferior lacrimal gland was removed via the conjunctiva. One year later, as the symp-

toms still persisted, a remnant of the inferior gland was removed. Groenouw, November 22, 1907, removed the orbital lacrimal gland through an incision through the eyebrow. The result was a cessation of the tearing. C. L.

Influence of Dionin on the Deeper Tissues.

ARLT, Vienna (*Wochensch. f. Therapie u. Hyg. d. Auges*, March 19, 1908, Vol. xi, page 193). Arlt reports the following case:

Patient, 40 years of age, noticed December 14, 1907, on awaking, that the vision of his left eye was impaired. Twelve days later he came to Arlt, complaining of blurring of central vision. On the night of December 13th, he had had so severe an attack of coughing that he vomited. Right eye very myopic. Left eye also myopic. Ophthalmoscopically, a nearly oval hemorrhage into the macula, of about 1.5 mm. diameter. To this corresponded a central scotoma. There was no arterio-sclerosis. Treatment with dionin was begun January 2, 1908. Fifteen minutes after use of 0.005 gms. in powder form, the patient said he could see better. The vision had increased from 5/8 to nearly 5/6. No ophthalmoscopic examination. The next day the vision was 5/5—5/4, there was no trace of a scotoma, and the ophthalmoscopic examination was negative. One month later, fundus was still normal; and vision unimpaired.

C. L.

Has the Serum Treatment of Diphtheria Resulted in a Decrease of the Cases of Accommodation Paralysis?

BYLSMA, R., Middleburg (*Wochensch. f. Ther. u. Hyg. d. Auges*, March 19, 1908, Vol. xi, p. 194). In ten years Bylsma has had 46 children with post-diphtheritic paralysis of the accommodation, in none of whom the diagnosis of diphtheria had been made, on account of the mildness of the case, or its location in the nose. In all cases, the accommodation only was affected, the pupil being intact. No patient had been treated with serum. In the same ten years he has never had a case of paralysis where the patient had been treated with serum. From this he concludes that serum treatment is to be credited with prevention of post-diphtheritic accommodation paralysis. C. L.

Paper Dressing for the Eye.

WOLFFBERG, Breslau (*Wochensch. f. Ther. u. Hyg. d. Auges*, April 2, 1908, Vol. xi, page 209), warmly recommends the use of paper-cotton (Papier-watte) in the treatment of eye diseases, especially those treated in the out practice. It is much more easily handled and has a greater absorptive power than the substances ordinarily used.

A Forgotten Middleburger.

BYLSMA, R., (*Wochensch. f. Ther. u. Hyg. d. Auges*, April 16, 1908, Vol. xi, page 225). Bylsma recalls to the remembrance of the scientific world the name and writings of Abraham Gotthelf Kästner. In a work published in 1755 (105 years before Donders' work) he described the relation of the refractive power of the eye to the retina, and the resulting position of the image. In other words, he knew theoretically, for he was a physicist and not a physician, the condition which we now call hypermetropia and myopia. Later than he, but earlier than Donders, was J. A. Hess, of Middleburg, who in 1842 published a work entitled "Theoretisches und Praktisches Handbuch der mechanischen Augenheilkunde, das Sehen, das Mittel wodurch wir sehen, die physiologische Tätigkeit der Augen, die Eigenschaft und Fehler der Hilfsgläser und die Art und Weise wie dieselben bei den mechanischen Augenkrankheiten angewendet werden sollen."*

Under this comprehensive title, he described *presbyta* (at present called presbyopia) *myopia*, and *presbyopia* (at present hypermetropia). He recognized that a person might require concave glasses for distance and convex for near vision. Bylsma thinks that inasmuch as Hess was known to French and German authors, he was probably known also to Donders, when he wrote his book.

C. L.

*Theoretical and Practical Handbook of Mechanical Ocular condition, Vision, the method by which we see, the physiological functions of the eyes, the properties and shortcomings of spectacles and the way the latter should be used in mechanical affections of the eyes.

**Unilateral Reflex Immobility of the
Symptom-Complex of Ocular**

ABELSDORFF, Berlin (*Mediz. Klin.*
in *Wochensch. f. Ther. u. Hyg. d. A.*
xi, p. 228). This condition is seen
where the oculo-motor paralysis is
up. This, he explains by the fact that
paralytic muscles are at times easier
movements. An example of this is
sis, where the zygomatic muscles
taneous action of the orbicularis

**Tuberculosis and the Etiology of
Conditions of the Eye and Its Adjuncts
Chronic Uveitis**

STOCK (Abstract in *Wochensch. f.*
April 26, 1908, Vol. xi, p. 229) in-
tuberculosis into the circulation of
ocular conditions very closely resem-
such as iritis with nodular formation
itis disseminata. He considers the
very good diagnostic agent in chronic

Tabes and Syphilis

WERNICKE, O., Buenos Ayres (*Cen-
tralbl. f. Ophth.*, May, 1908, Vol. xxxii, p. 128)
that almost all tabetic patients have
syphilitic patients, however, have
has noticed that those who have syphilitic
iritis escape.

**An Explanation of the Different
Retinal Layers in the Eyes of
and Invertebrates**

LAUGE, O., Braunschweig (*Centralbl.*
May, 1908, Vol. xxxii, p. 131) states
vertebrates and invertebrates develop

layer of cells of the medullary plate. In the latter, the development of the eye continues directly and in loco, while in the former there is an inversion, due to the union of the two ends of the plate to form the medullary canal. In this way the outermost cells of the optic anlage becomes the innermost cells of the primary optic vesicle. C. L.

A Case of Lymphangioma Cavernosum Orbitae.

FEHR, Berlin (*Centralblat. f. prakt. Augenheilk.*, May, 1908, Vol. xxxii, p. 134). The patient had (1) a protrusion of the right bulb of 12 mm. forward, with good movement; (2) right hypermetropia, left emmetropia; (3) there was a choked disk on the right side. Krönlein's operation was performed, removing a tumor of the size of a plum, which was found microscopically to be a lymphangioma cavernosum. The ocular result was very good, as the eye returned to normal. C. L.

Glaucoma Malignum After Iridectomy for Glaucoma, Recovery After Posterior Sclerotomies; Observation Period of Ten (10) Years.

HEGNER, Basel (*Zeitsch. f. Augenheilk.*, June, 1908, Vol. xix, No. 6) has observed a case in which incipient glaucoma was caused by an attack of influenza. After an attack of follicular catarrh the glaucoma symptoms became very intense, so that an iridectomy was performed in spite of a doubtful prognosis. The eyeball remained hard, the anterior chamber did not reform and vision consisted of hand movements. After two posterior sclerotomies the anterior chamber reformed, the tension fell and vision was improved.

A cystoid cicatrix formed at the scleral portion of the iridectomy, which with the use of miotics, was sufficient to restore the vision to 2/7 of normal, which was retained for eight months.

The patient returned ten years after the operation with practically the same vision as she had when last seen, nine years before. She had had no treatment during this interval.

ABSTRACTS, GERMAN OPHTH

The author believes that the good results of the posterior sclerectomies, which formed a new chamber to reform and assisted in the removal of the cystoid cicatrix.

The Coincidence of Optic Atrophy and Universalis in Sister

SIEVERT, Mannheim (*Zeitsch. f.*
Vol. xix, No. 6) has observed two
occurring in a 9-year-old girl and

In both cases there was tremendous connective tissue throughout the body. The ophthalmic findings and in the case of the boy there were suggestive of retinitis pigmentosa. X-rays showed no marked disease or enlargement

The peculiarity of these cases (1 and 2) was that there was no apparent etiologic factor in the history of the disease in sister and brother. It may not be due to disease of the hypophysis. The accompanying phenomena were absent. There was deformity of the base of the skull in the form of a turcica and an absence of bitemporal fields were concentrically contracted. The occipital half was affected than the temporal half.

A Case of Multiple Neu

MARX, Strassburg (*Zeitschrift. f. ophth.*, Vol. xix, No. 6) reports a case of ptosis affecting the upper lid of a 24-year-old man. 11 years he had been stung at this site. The thickening never disappeared entirely after being struck with a piece of wood. The ptosis caused by the swelling of the lid affected with neurofibromata.

The patient had numerous neurofibromas of the extremities and trunk. The tumor was well circumscribed. On gross examination it was a firm, white, lobulated mass. On account of the danger of recurrence, the tumor mass should be as completely removed as possible.

**An Infrequently Recognized Form of Typical Defect of
the Optic Nerve Entrance—A Circumscribed
Excavation on the Papilla.**

REIS, WILH., Bonn (*Zeitsch. f. Augenheilkunde*, June, 1908, Vol. ix, No. 6), describes four cases of partial defect of the optic nerves, presenting the appearance of a dark colored area usually on the temporal half of the disc. Its contour gives the impression of cyst-like area, the depression in the nerve being covered in part by fine membrane. One case was associated with macular hole formation.

The optic nerve defects are considered congenital and form a distinct type which seems to be little recognized.

F. K.

SOCIETY PROCI |

CHICAGO OPHTHALMOL

Meeting of May 11, 1908, the P
ruff, in the chair.

Symposium on Injuries to the Eye Bodies in the

Dr. Gordon G. Burdick (by in subject has never received the a by ophthalmic surgeons or the x general want of information rega described the methods employe bodies in the eye with the x-ray a ray is infallible as a means of diag do occur. These must be charge in the work. Cases should be ser diagnosis and not for the skiagraph operator is more capable of readi ophthalmic surgeon or any prac in this work. Dr. Burdick also devised by him, by means of v methods of locating foreign bodie ried out, the Grossman, Sweet an

Indications for Enucleation :

Dr. Geo. Fiske believes that the exenteratio bulbi. It is adapted to The advantages of the method bility of the stump; (2) leaving th ing infection; (3) less likelihood and swelling of the soft parts; much better worn. Dr. Fiske en of removing entirely the contents no shreds of chorioid, particularly entrance. Instead of the glass ba some pith-like substance which c blood clot and become organized

Migratory Ophthalmia in Its Relation to Injuries of the Globe.

Dr. H. W. Woodruff called attention to the serious complications which may follow perforating wounds of the eyeball and operations on the same. Acute purulent processes can, in most instances, if dealt with in the first twenty-four hours, be checked by deep injections of cyanid of mercury. Among 199,454 cases at the Illinois Eye and Ear Infirmary only 108 cases of migratory ophthalmia have occurred. The removal of all eyes blinded from traumatism is the best prophylaxis, especially if tension is subnormal. Woodruff has employed large doses of sodium salicylate in nearly all cases of serious injury not demanding immediate enucleation. Mercury must be used until the physiologic effect is produced. He emphasized that an eye with poor projection and lowered tension should be removed, provided that the lowered tension is not due to the long-continued use of atropin. The general condition of the patient must be looked after. As a rule, the most that can be hoped for is that the active symptoms will subside, leaving the iris firmly adherent to the capsule of the lens, which in all probability is not cataractous. After a year or eighteen months, if there has been no recurrence of the inflammation and the intraocular tension has not been diminished, the patient's perception of light being satisfactory, operative intervention may be considered.

Some Points Concerning the Treatment of the Commoner Penetrating Wounds of the Eyeball.

Dr. Frank Allport discussed particularly the steel and iron injuries in workmen. He emphasized the importance of prompt and early treatment. He said that intraocular foreign bodies are always dangerous and should always be removed, if possible. The x-ray should be employed for diagnosis, and also the magnet, and when both these agents fail to disclose a foreign body, it may be assumed that none is present. Unless the fragment is located quite anteriorly and can easily be removed by the forward route, Dr. Allport favors extracting it through a scleral opening, which he considers to be much safer than dragging it over

the delicate and sensitive tissues of the anterior portion of the eyeball. No attempt should be made to suture the scleral opening, because it necessitates too much pressure, the needle might break off in the eyeball, and infection may occur. It is quite sufficient to suture the conjunctiva with catgut. The dangers of infection and retinal detachment are less by this method than by extraction by the anterior route. Before operation he employs a 25 per cent argyrol solution, and after the operation he usually applies over the closed lids a thin coating of Crede's ointment on a piece of gauze. Daily dressings are made. Rest, dieting, catharsis and large doses of salicylate of soda are a part of the treatment. He considers it a mistake to attempt to preserve an eyeball in which vision is hopelessly destroyed and which is badly mutilated, especially when the mutilation is in the ciliary region.

Dr. Casey Wood was glad to know that Dr. Burdick took all the responsibility of localizing foreign bodies in the eye. He was in the habit of declining to look at skiagraph plates because he did not consider it to be within his province or his ability to decide whether, in doubtful cases, a certain mark or spot on the plate indicated a foreign body or not. Of course, when a large body enters the eye, it is easy to demonstrate its presence not only by the skiagraph, but by means of the ophthalmoscope, sideroscope, Haab's magnet, etc.; it is very small bodies that give rise to difficulties in diagnosis. It is for the skiagrapher alone to deliver the opinion in these cases; it is better for the patient and for the ophthalmologist. Dr. Wood also referred to those cases in which there is a penetrating wound of the cornea, iris or lens and yet no foreign body is found in the globe or orbit, the missile having entered the eye and dropped out again. Before the days of easy localization of intraocular foreign bodies he scouted the idea of the existence of such cases, but he is now convinced that they are not very uncommon. He took exception to Dr. Allport's method of extracting foreign bodies through a scleral incision rather than to draw them into the anterior chamber with the magnet, after the plan of Haab. Although the latter procedure would seem, at first, to produce a more extensive trauma of the anterior part of the eye, he thought the results are better. Of

course, he said, if everybody extracted these bodies as skillfully as Dr. Allport, the argument would not be so strong in favor of Haab's method, but in the average extraction as made by the ordinary practitioner, the danger of infection and other accidents is increased.

Dr. Wood feared that physicians, as a whole, do not realize the dangerous character of finger-nail wounds of the cornea, as in the case reported by Dr. Fiske. They are not as a rule the simple things they seem to be. There is, he said, no slight external wound of the eye that is more serious and more likely to cause trouble.

Speaking of the involvement of the sympathizing eye, he asked how we are to know when an infection of the interior of the eye will produce a migratory ophthalmia and when not. He referred to Randolph's experience with toxins made some years ago, in which he showed that bacterial toxins, as far as the tissues of the eye are concerned, are just as destructive as the bacteria that excrete them, and inasmuch as toxins can be readily carried from one eye to the other, why not believe that migratory ophthalmia is essentially a toxin-invasion from one eye to the other? He thought the term "migratory ophthalmia" is more expressive of the condition than the "transferred ophthalmitis" of Oliver. Dr. Wood has frequently attempted to introduce into factories devices for preventing penetrating wounds of the eye. In Germany, where there is a large state insurance for operatives, the authorities insist on workmen using goggles and other forms of protection against injury. One factory in this city that provided goggles for workmen could not persuade the men to wear them, although they daily observed about them examples of eyes lost from plainly preventable injuries.

Dr. W. A. Fisher stated that four years ago, when reporting a large number of cases to this society, he advocated removing the foreign body first and making the picture later,—if the foreign body could not be found. He has not had any occasion to change his views. Like Dr. Wood, he does not care to see the plate but wants to have the skiagrapher make the diagnosis, if the diagnosis be made that way.

He felt that if Dr. Allport had a foreign body he would not want it removed in the way he suggested. If the lens

is injured by a foreign body, there is no reason why much more injury can be produced by removing the foreign body through the cornea. If an incision is made in the sclera detachment of the retina may follow. He referred to a boy, nine years old, who was injured in the right eye. Two months later, when first seen, he was practically blind in both eyes, hopelessly in the right, with a fully developed sympathetic inflammation in the left. He used fluorescin for the first time in such cases in this case, with a negative result. He removed the exciting eye within two hours after the patient's first visit to him. A short time after using fluorescin in this case he saw a case in consultation with Dr. Colburn that was thought to be sympathetic inflammation. Fluorescin was suggested and used as in the first case, with a negative result.

Some days later, when trying fluorescin on a case of cyclitis, several instillations were used and the deposit beautifully demonstrated. The two cases of sympathetic inflammation were again tested by dropping in two drops of a one per cent solution of fluorescin every five minutes for one-half hour. The deposit could easily be seen on Descemet's membrane in both cases, while no deposit could be seen on several normal eyes that had the same solution dropped in the same number of times. He did not mention fluorescin as being new, but thought the application of its use was not fully understood. He is of the opinion that fluorescin, if properly used, should have a place as a means of diagnosis in injuries of the eye.

Dr. Chas. H. Beard, speaking of the more extensive perforating injuries of the sclera, emphasized that early treatment is important. If quick healing, without complications, can not be effected, the treatment is in vain. Even in the most severe cases with extensive involvement of all the tunics, it may be in the ciliary zone, such healing may take place if conditions are favorable. How make them favorable? Make sure of the absence of a foreign body; use copious, warm, mild antiseptic irrigation, and remove all shreds of uvea, retina and vitreous. He believes that small wounds, and even quite extensive ones that are meridional, may often be left without sutures, simply cleansed, extruding vitreous snipped off, and the conjunctiva stitched over them. If the scleral wound inclines

to gape widely, it should be sutured. If the scleral and conjunctival wounds correspond, the same threads may include both; if they do not, it is best to close the scleral opening with absorbable sutures and the conjunctival with silk. Indeed, it is usually best that these wounds do not correspond, even if a piece of conjunctiva constituting one lip of the wound must be excised to prevent coincidence. The wound is not only freed from dirt and vitreous, but from shreds of chorioid and retina, if these are present. Double-armed interrupted sutures are preferable, so that the needle can be introduced from within on both sides. The thread should, if possible, be made to include only the outer layers of the sclera, and in no case should the uvea and retina be included either in the wound or in the suture. Thread and needles should be very fine and the latter sharp. For the after-treatment little is to be said. He would trust more to thorough, even exhaustive, first aid than to occlusive bandaging, rest in bed, diet and general or constitutional treatment. Argyrol disks, or in solution, is a valuable adjunct to the dressing.

Dr. Henry Gradle stated that the all-important question in connection with any perforating injury is: whether there is infection present or not. If the injured eye is not infected it is not dangerous to the other eye; but if the eye becomes infected, it is always a source of anxiety to the surgeon because he cannot tell whether secondary involvement of the other eye may follow or not. How can one tell whether the first eye is infected? In some cases it can be stated positively that there is no infection. There is only slight ciliary injection limited to a narrow zone; or there may be only a little injection around the wound. These cases are positively not infected. On the other hand, any one of experience can see that certain cases are infected by reason of the extensive vascular reaction. But there are cases where one can not be sure that infection is not present or where, if it is, it surely is but very mild and may be overcome by the tissues. These are cases where the surgeon's responsibility is greatest.

If the foreign body is in the eye, even without infection, the injured eye is always in danger. Iron will almost invariably lead to siderosis, and sooner or later sight will be lost by sclerosis of the retina and its arteries. Glass

also seems to be capable of producing aseptic destruction of the injured eye. He has seen cases where the eye had apparently recovered and yet went on to ruin because of the presence in it of glass. Such eyes had better be removed. Again, a foreign body may be aseptic, or if not, the eye may recover from infection, and still a secondary infection may occur very much later. A few years ago he saw an eye injured by a mining accident. After a few weeks, the eye seemed harmless, with a moderate degree of sight. The eye was not soft or tender or sensitive to light, although there undoubtedly were particles of rock in that eye. The eye behaved well and for a year and a half there was no reaction. Then violent infection set in secondarily. Either germs had been latent in the foreign body, or they came through the blood stream to a locus minoris resistentiae. The eye had to be removed.

The effect of sodium salicylate in preventing sympathetic ophthalmia does not seem to be proved. It probably may, he said, lessen the number of such cases by affecting the primary eye favorably, but two cases of which he has knowledge became sympathized under the use of sodium salicylate, so that as a preventive it can not be depended on. Similar conclusions were arrived at in Widmark's clinic, where 40 observations were made.

As to the effect of the salicylate on the sympathized eye, he can speak with more certainty. Of three cases he saw from beginning to end all recovered with perfect sight. They were typical cases of long duration, but recovery was permanent. In one of them the sympathetic trouble broke out 48 hours after the removal of an old injured eye. It had been injured forty years previously. After a few weeks of fresh inflammation, the patient consented to enucleation, and after 48 hours, the second eye became involved. The second case broke out about the third or fourth week after the injury, when the first eye was well toward recovery. It ran a slow and tedious course, but the man recovered good sight in both eyes. It is doubtful, he thought, whether such a recovery would have been possible without sodium salicylate in large, very disagreeable doses persistently kept up until permanent recovery.

The question whether the disease of the second eye is sympathetic or not, as in the case quoted by Dr. Fiske,

he said it is very often a difficult one to decide, especially in instances where the primary eye has been removed for some time. There is nothing absolutely characteristic in the appearance of the second eye from which one can draw the conclusion that the disease is of sympathetic origin. For instance, a young man had had a small leucoma of the left eye, probably the result of gonorrheal infection at birth. It had never given him any trouble. When 18 or 19 years old, the other hitherto healthy eye passed through a severe attack of iridocyclitis. The disease was absolutely intractable. After two or three treatments the eye was ruined; retinal detachment was presumably present; postmortem proved it so. The eye was enucleated. Eleven years later the other eye became inflamed in exactly the same way; passed through a typical violent iridocyclitis, which destroyed it completely. The examination of the first eye was not made thoroughly to determine whether it had been tuberculosis. But had that eye still been present or removed recently, anyone would unhesitatingly have called the disease of the second eye sympathetic. Yet, after the lapse of eleven years since enucleation sympathetic involvement of the remaining eye was out of the question.

Dr. Lewis saw a patient last December about 19 years old whose eye was injured by a portion of a copper cartridge entering the eye about three millimeters from the corneo-scleral margin, and 36 hours later he could see a piece of the copper protruding forward through the root of the iris. There was a mild degree of iritis and at the side of the piece of copper there was a sharply circumscribed area of exudate on the anterior surface of the iris. The next morning he made a corneal incision and an iridectomy, removing the piece of copper. The patient was in the hospital ten days, when all of the iritis had subsided. His media were clear and vision with a $+0.37$ cylinder at 75° was 30/33. Last month the vision was 30/33+ with correction. He gave a rather hard prognosis. Fuchs reported a similar case where ten years after the injury separation of the retina had occurred.

Dr. O. Tydings emphasized the value of the skiagraph as a means of diagnosis, and the fallibility of the giant magnet. On one occasion he had a patient who came to

him February 10, 1902, for refraction. There was some deposit on the posterior capsule, and on inquiry the fact was elicited that in the August before he had had a slight accident in the factory, but had no trouble. Later, April 7th, he returned with an attack of retinitis. He tried the giant magnet, but got no response. On October 8th, he returned again; the magnet was tried again, but with no response. On January 6, 1903, he had more trouble, and was seen by Dr. Snydacker, who had a skiagraph made, which showed a foreign body. The lens was perfectly clear and remained so until the last examination, when vision was very much reduced, but it was on account of the retinitis and not on account of the lens. In an effort to remove the foreign body through the sclera the eye was lost. That case showed the value of the skiagraph. Dr. Tydings knows of a number of cases where the giant magnet failed to reveal steel in the eye when it was there.

He was surprised to hear of the removal of pieces of steel through the sclera on a route of preference. He has not seen the least bad result from foreign bodies brought out through the anterior chamber directly chargeable to that method. A patient came to him about ten days after the injury. The only symptom was failure of vision. Examination disclosed a piece of steel in the lens, proving that the history of the patient cannot always be relied on.

Dr. Burdick again called attention to the fact that the x-ray does not make mistakes; that the giant magnet is not always reliable because many of the high-grade steels are not magnetic and for that reason do not pole with the magnet. The opinion of the skiagrapher is of great value because the making of skiagraphs and reading them is his business. Ophthalmologists ought to remember that, and permit the skiagrapher to make the diagnosis in all cases.

Dr. Wm. H. Wilder stated that if in eyes that cause migratory ophthalmia there is not only a plastic but a proliferative inflammation, it might strengthen the idea that evisceration is just as good as enucleation. But he does not see that there is any great danger in removing the eyeball in toto, provided one keeps well within the capsule of Tenon, except in cases of specific infection, which can be determined beforehand by bacteriologic investigation. Of course, he said, it is a well recognized fact that one should

avoid enucleation in panophthalmitis in such a condition and evisceration is the suitable operation if the eyeball must be removed, but in other cases it seems that the wiser procedure is enucleation. He has observed that he does not get better motion or prosthesis from evisceration than from enucleation. So much reaction may follow evisceration, particularly if there is associated with it an attempt at introduction of an artificial vitreous, that the muscles will be so bound down that there will be practically no more motion of the artificial eye than after a good properly performed enucleation.

Another point too often neglected, is choosing the time to operate on the eye which has undergone sympathetic or migratory ophthalmia. Younger practitioners are too prone to want to do an iridectomy or to remove the lens before they should. One should, he said, wait at least a couple of years after the eye becomes quiescent before opening the eyeball to do an iridectomy or removal of the lens, otherwise the result will be disappointing because of the plastic exudation which will fill the pupil.

Dr. Allport thought that another reason why the magnet does not remove the steel is that occasionally the projectile passes in with such force that it goes completely through the vitreous chamber and becomes firmly imbedded in the posterior portion of the eye, so that it cannot be withdrawn by the magnet. As to the route of removing the foreign body, if it is in the front part of the eye, it ought to be taken out that way, but if it is in the vitreous chamber beyond the lens, it should be withdrawn through the sclera, making the opening carefully with a sharp knife, large enough to remove the foreign body. The lips of the scleral wound should be held open with a demagnetized tenaculum and the magnet being placed at the opening promptly withdraws the foreign body.

Dr. Fiske favors exenteration because v. Graefe, in a long series, found that enucleation favors the development of meningitis. As to the mobility of the eye, figures favor evisceration from 5 to 15 degrees. As to infection in his case, it certainly was present, and was diagnosed by Dr. Wood and himself.

Symblepharon.

Dr. Wilder exhibited a boy who had an extensive burn of the eye with lime resulting in a symblepharon of lower lid and also quite a destruction of the upper cul-de-sac. The new culs-de-sacs are well lined with Thiersch grafts, illustrating his method of holding the grafts in place with plates covered with high-melting point paraffin, which are a great advantage in cases where the cornea is in whole or part intact, as there is less danger of damage to that part than if metal plates alone are used.

Cyclodialysis in Glaucoma.

Dr. Wilder: A man had glaucoma in the left eye 17 years ago and had an iridectomy done. Four or five weeks ago he came with glaucoma of the other eye; tension +2; vision lowered about 20/200. A cyclodialysis after the method of Heine and Mullen was done with cocain. The pupil is normal. Nothing else has been done for the patient. Vision is now 20/30, fields are markedly increased and tension has remained normal since the operation, now six weeks ago.

A Case of Sympathetic Ophthalmia.

Dr. Oscar Dodd presented a case of sympathetic ophthalmia which dated back to May, 1906. The right eye was injured by a piece of glass, the cornea being cut towards the periphery, apparently not involving the ciliary body. The iris prolapsed; there was considerable irritation and practically no vision remained. He abscised the iris, after which there was slight prolapse of vitreous. Dr. Nance enucleated the eye June 23d. Five days later the second eye became involved; vision decreased in spite of all treatment, but after a time began to improve. About the middle of August there was enough vision for the patient to get around and walk. The vitreous was clearing and there was practically no irritation. The patient was very anemic and in bad condition generally, so that it was difficult to carry out any treatment whatever. In October the eye was perfectly quiet, and the vitreous was so clear that the fundus

could be seen, although it was practically impossible to tell what her vision was. Dr. Dodd did not again see her until January 31, 1908, when she returned again completely blind, with the eye much inflamed, pupil filled with exudate and prominent blood vessels all over the surface of the iris. Now the inflammation has quieted down, but she only has light perception. Projection is very good and tension is normal. Every effort is being made to get the patient into condition so that something may be done.

MORTIMER FRANK, *Secretary*.

BOOK REVIEW

Ophthalmic

A Handbook of the Surgical Cases of
its Appendages as practiced
BY DR. JOSEF MELLER, Vienna
Son & Company, Philadelphia

A book upon Ophthalmic Surgery, based upon observation, teaching and experience, Fuchs, may well speak for its special recommendation. Dr. Meller and describes very clearly the anatomy of, and the complications frequently occurring in, operative procedures upon the eye.

Its two hundred and forty-five and eighteen original illustrations are unencumbered by innumerable names which so often tend to obscure from the underlying principles.

In other words, Dr. Meller has given only those which have been tried out with successful results, and which are the Vienna Clinic.

About one-third of the book is devoted to Cataract Extraction and Glaucoma. In his description of these most important diseases with greatest care every detail is given, more of which so often means failure of the operator.

For the first time, Dr. Meller has published a description of the operation of the lacrimal sac. This operation is so often poorly described. With regard to this operation, it is one of the most difficult in ophthalmology. The difficulty lies in finding the correct point of incision.

The operations for Ptosis are perhaps given less attention than they warrant. The method of Pannas is well described.

demn it, and that of Motais escapes with a definition. It will be remembered, however, that Dr. Meller is describing only the operations which he practices.

"Ophthalmic Surgery" will certainly meet with great favor in this country, and especially among the younger men who are still in the experience school, so to speak. It is a safe guide for him who must still borrow and use the experience of others.

WILLIAM T. SHOEMAKER.

Manual of Ophthalmic Surgery and Medicine.

BY WALTER H. H. JESSOP, M. A., M. B., Cantab., F. R. C. S., England. Published by J. & A. Churchill, London, 1908; P. Blakiston's Son & Company, Philadelphia. Price, \$3.80.

The Second Edition of this well known manual now appears thoroughly revised and brought to date. It contains over five hundred pages, one hundred and fifty-five illustrations, nine color plates and twelve photographs.

Like all books of its class it systematically recounts the known facts pertaining to ophthalmology, which students and practitioners should be familiar with. The author's style, moreover, is clear and direct, and enables the reader to comprehend at once the essential points under discussion.

The illustrations are for the most part good and well selected. Some of the fundus pictures are reproductions of photographs taken by Professor Dimmer with the ingenious apparatus he has devised for photographing the fundus. A useful appendix contains a short description and enumeration of the ordinary drugs and preparations used in ophthalmic practice, as well as a chapter on lenses, spectacles, etc., and finally the regulations for vision testing of candidates for the government services.

Jessop's Manual is one of the most complete and best arranged works of this type and will amply fulfill the needs of those for whom it is intended.

WILLIAM T. SHOEMAKER.

Pulsating Exop

BY GEORGE E. DE SCHWEINITZ, M
LOWAY, M. D., of Philadelphia.
Philadelphia and London, 1908

In this essay, the authors hav
pertaining to pulsating exophthalm
ers reported the first case, until J
313 cases have been placed on re
viewed and tabulated 69 cases no
sued tabular statements.

Therapeutic measures, surgical
been employed in the treatment
carefully elaborated and compared
termine those surgical procedures
the greatest advantage in the con

From their analyses, the authors
venous ligations and operations, a
ures for success.

Seven cases of operation upon t
reported since 1897, gave unifor
the authors think that this procedu
fore ligation of the carotid, and
the second carotid, provided the f
duce the desired result.

They furthermore say that if a
the orbit, its ligation should be the
a pulsating venous mass is eviden
the cases.

In marked contrast to the resul
ation, are those obtained from co
carotid. In the authors' series of
ter procedure was tried twelve tin
case.

Drs. de Schweinitz and Hollowa
able and important contribution in
and correct statement of the presen
thalmos and its treatment. Fortuna
frequently encountered, but when
that no mistake in judgment be m

NEWS AND NOTES.

The second circular announcement of the Eleventh International Congress of Ophthalmology, to be held at Naples, April 2-7, 1909, has been received and reads as follows:

HONOURABLE COLLEAGUE:

In repeating to you the invitation to take part in the International Ophthalmological Congress of Naples, we add,—for the ophthalmologists who are interested in questions concerning blindness and the betterment of the condition of the blind,—that from March 30th until April 3rd, the International Congress of Typhology will also be held in this city. The members of the Ophthalmological Congress will be invited to take part in the afternoon session, to discuss together the following official subject:

“Whether it be advisable in the treatment of patients afflicted with diseases immediately conducive to blindness to give them correct information as to the precarious condition of their sight, and such instruction as may be necessary to them when blindness overtakes them.”

The sittings of the Ophthalmological Congress will take place in the buildings of the Royal University of Naples, by kind permission of the rector.

The Exhibition, in connection with the Congress, of objects appertaining to Ophthalmology, touching its practical as well as its historical side, will be situated on the premises of the *R. Clinica Oculistica* in S. Andrea delle Dame.

In order to honor the memory of the founder of the Eye Hospital of Naples, on the occasion of the Congress, the Presidency, from the remaining funds of the International subscription of 1905 intended to commemorate the lamented master, will assign six gold medals, each bearing the inscription of “*Premio de Vincentiis*,” with the purpose of encouraging young students of Ophthalmology, to the authors of the six most valuable as yet unpublished articles on the subject of ophthalmology.

The latest date for the presentation of the articles, which should be typewritten, has been postponed until October 31st.

The authors are further recommended to send the registration fee not later than January next, accompanied by a

visiting card with the exact address, for the careful addressing of the membership tickets, and of the request for the reduction in the rates for the sea and rail travelling in Italy.

Members wishing to secure rooms in advance should apply to the Presidency of the Committee, not later than February, 1909, that they may obtain, during the time of the Congress, apartments in the best hotels overlooking the sea in Naples and Posillipo.

Under the management of the committee, an excursion will be arranged to Capri by steamer, and visits made to the Grotta Azzurra and Sorrento; to Pompeii and its excavations; and to Pozzuoli, with visits to the antiquities and the Solfatara.

In conclusion the members of the Congress will receive all necessary information concerning visits and excursions to the city and suburbs, museums, Vesuvius, etc., for which the government and municipality will show the utmost liberality, and private societies will offer greatest facilities.

Kindly accept, eminent colleague, the assurance of our most distinguished consideration.

For the Managing Committee,

THE PRESIDENT,
PROF. A. ANGELUCCI,

R. Clinica Oculistica, in S. Andrea della Dame.

Corresponding Members for Great Britain:

DR. WALTER H. H. JESSOP, London, W-73 Harley Street.

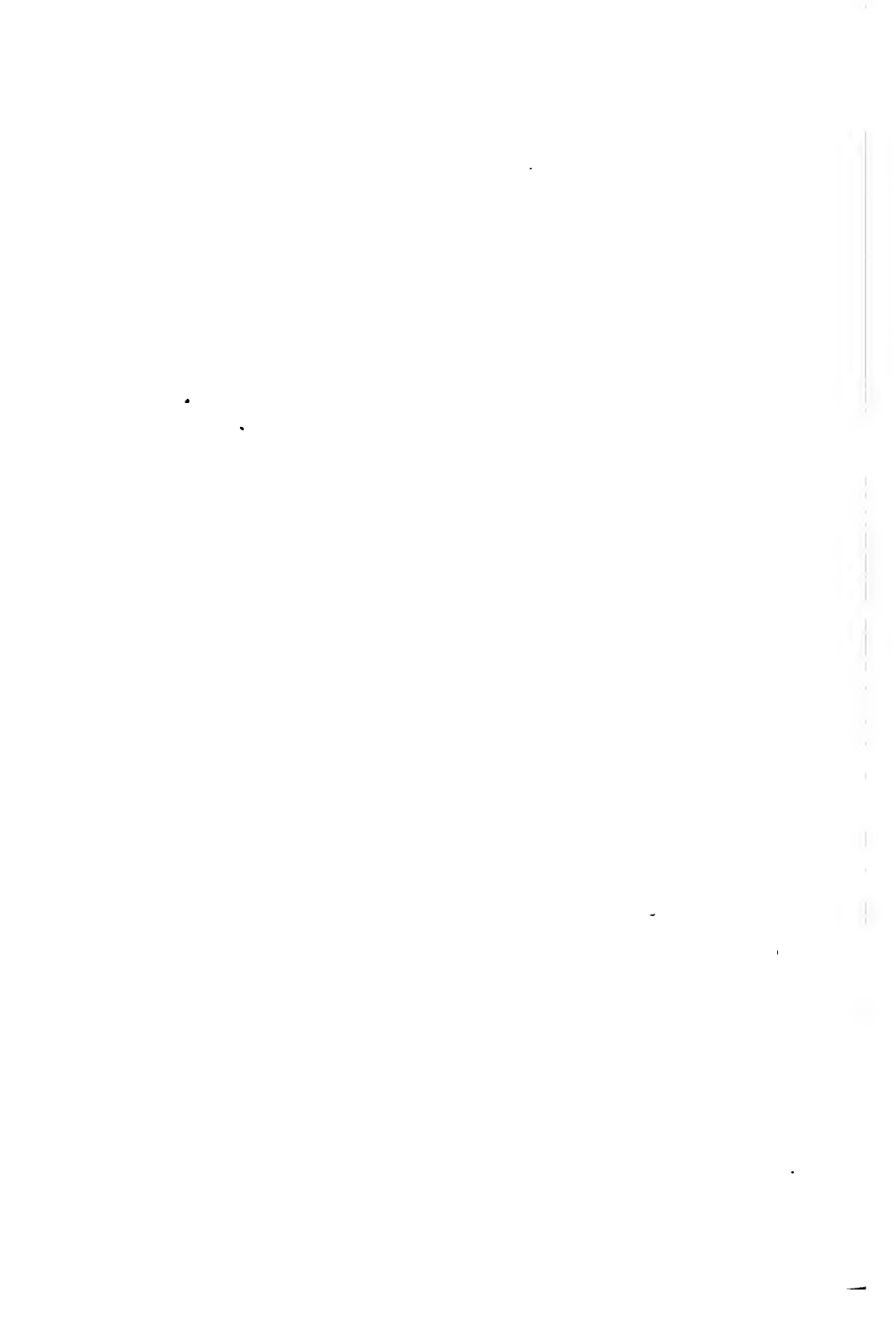
DR. GEORGE MACKAY, Edinburgh, 20 Drumshead Gardens.

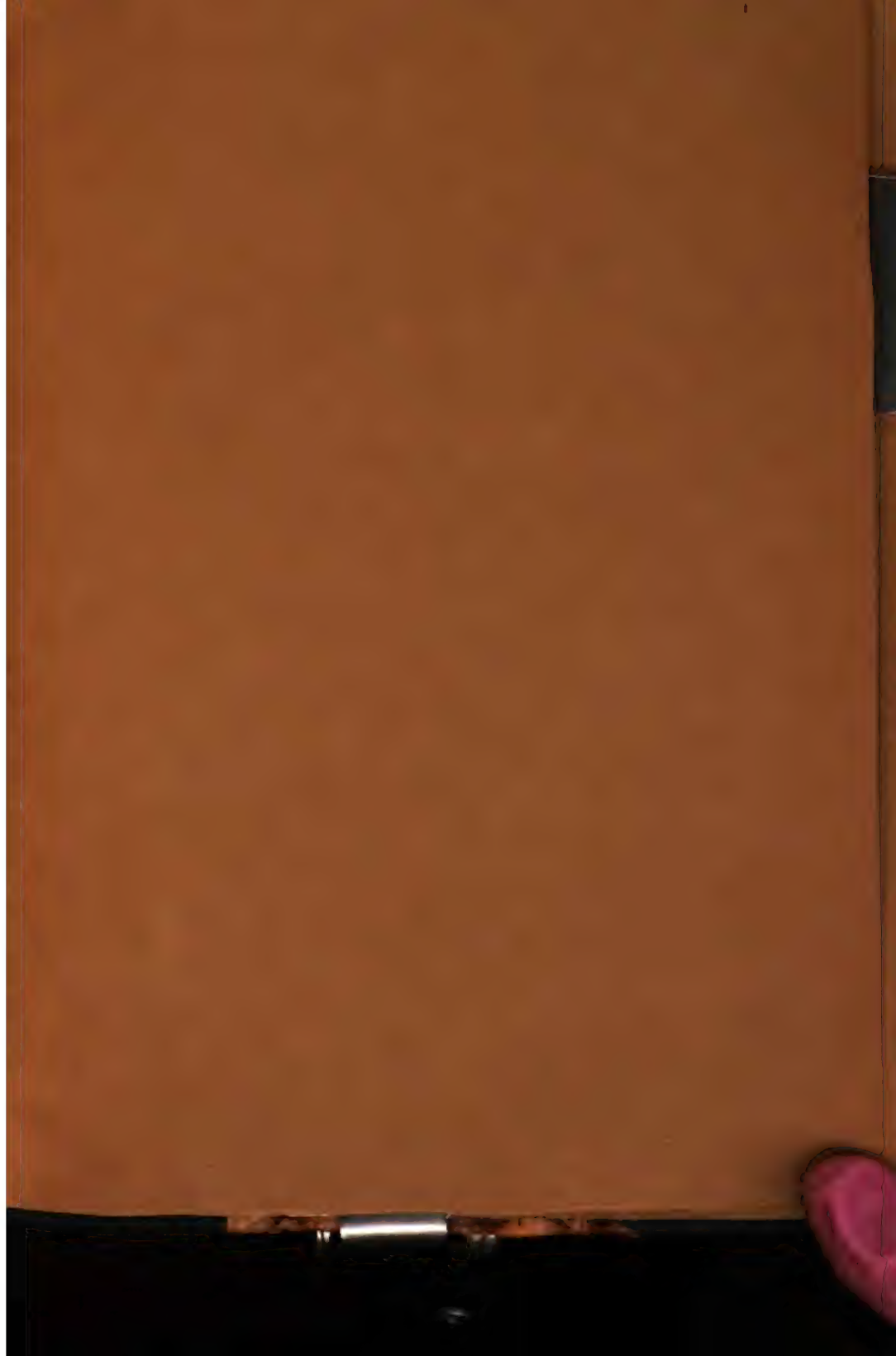
SIR HENRY R. SWANZY, Dublin, 23 Merrion Square.

For United States of America:

DR. HERMANN KNAPP, New York, 26 West 40th Street.

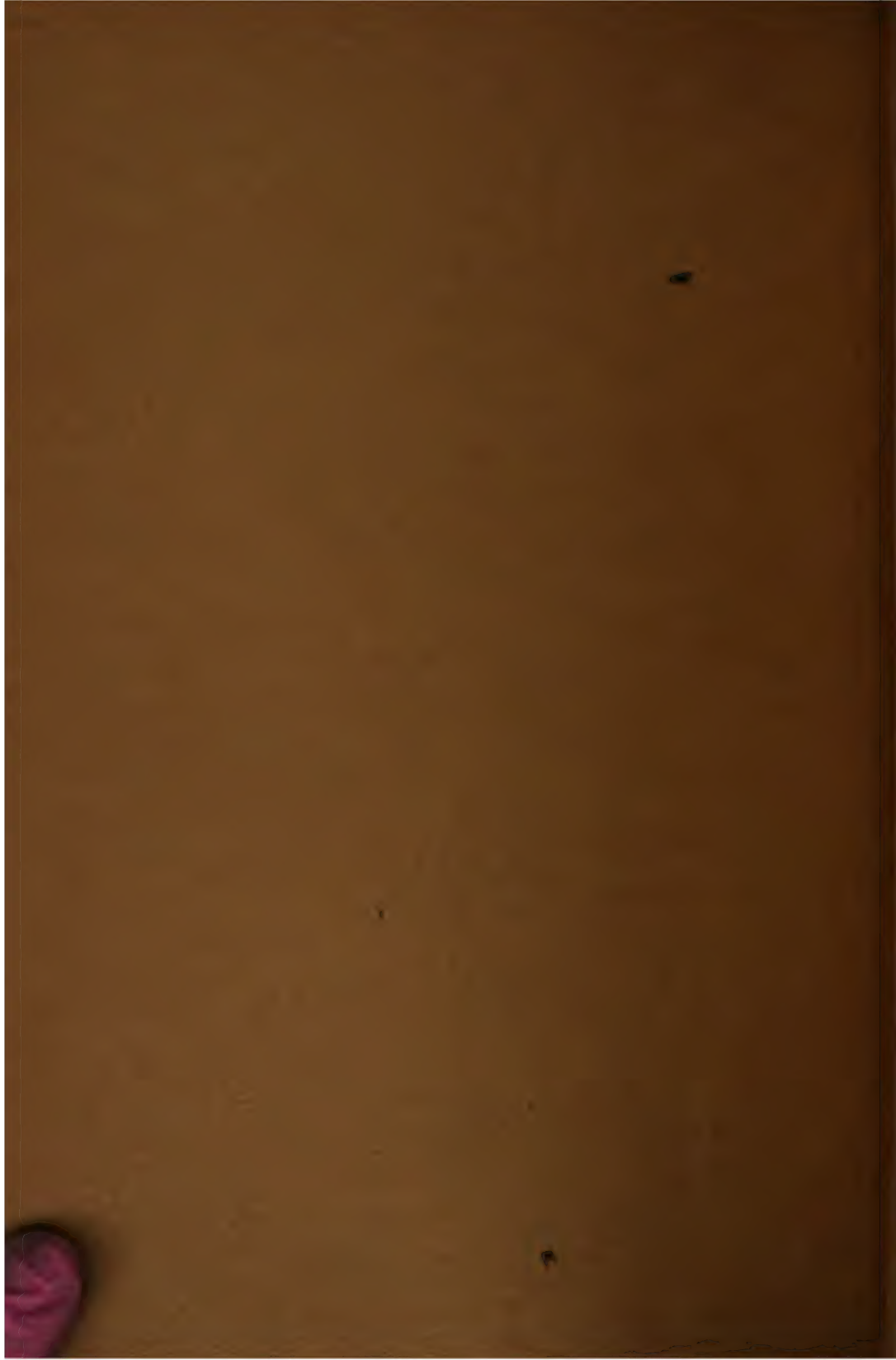
DR. G. E. DE SCHWEINITZ, Philadelphia, 1705 Walnut Street.











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